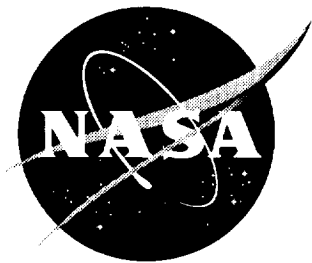NASA/TM-1999-209104

Computational Test Cases for a Clipped Delta Wing With Pitching and Trailing-Edge Control Surface Oscillations

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Abstract

Computational test cases have been selected from the data set for a clipped delta wing with a six-percent-thick circular-arc airfoil section that was tested in the NASA Langley Transonic Dynamics Tunnel. The test cases include parametric variation of static angle of attack, pitching oscillation frequency, trailing-edge control surface oscillation frequency, and Mach numbers from subsonic to low supersonic values. Tables and plots of the measured pressures are presented for each case. This report provides an early release of test cases that have been proposed for a document that supplements the cases presented in AGARD Report 702.

Nomenclature

c	local chord, ft (m)
c_r	wing root chord, ft (m)
C_p	pressure coefficient, $(p-p_\infty)/q_\infty$
f	frequency, Hz
H_o	freestream total pressure, psf (kPa)
k	reduced frequency based on root semichord, $\omega c_r/(2V_\infty)$
p	pressure, psf (kPa)
p_∞	freestream static pressure, psf (kPa)
q_∞	dynamic pressure, psf (kPa)
R_N	Reynolds number based on average chord
s	semispan, ft (m)
t/c	airfoil thickness to chord ratio
T_o	total or stagnation temperature, $^\circ$R ($^\circ$C)
V_∞	freestream velocity, ft/sec (m/sec)
x/c	streamwise fraction of local chord
y	spanwise coordinate normal to freestream
α_o	mean angle of attack, degrees
θ	amplitude of pitch oscillations, degrees or radians
δ	amplitude of control surface oscillations, degrees or radians
δ_o	mean control surface deflection, degrees or radians

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η	fraction of span, y/s
γ	ratio of specific heats for test gas
ω	frequency, radians/second

Introduction

Steady and unsteady measured pressures for a clipped delta wing (referred to by CDW) undergoing pitching oscillations and trailing-edge control surface oscillations have been presented in references 1 and 2. From the several hundred compiled data points, 22 static cases, 12 pitching-oscillation cases, and 12 control-surface-oscillation cases have been proposed for computational test cases to illustrate the trends with Mach number, reduced frequency, and angle of attack.

The planform for this wing was derived by simplifying the planform of a proposed design for a supersonic transport which is described (ref. 3) as the Boeing 2707-300. The strake was deleted, the resulting planform was approximated by a trapezoid with an unswept trailing edge, and the twist and camber were removed. In order to facilitate pressure instrumentation, the thickness was increased to 6 percent from the typical 2.5 to 3 percent for the supersonic transport. The airfoil is thus a symmetrical circular arc section with t/c = 0.06. A wing of similar planform but with a thinner airfoil of t/c = 0.03 was used in the flutter investigations of references 4 and 5, and a buffeting and stall flutter investigation documented in an internal report (NASA LWP-872, May 1970). Flutter results are also reported both for the 3% thick simplified wing and for a more complex SST model in reference 6.

One of the consequences of the increased thickness of the clipped delta wing is that transonic effects are enhanced for Mach numbers near one. They are significantly stronger than would be the case for the thinner wing. Also, with the combination of high leading edge sweep of 50.5° and the sharp leading edge, a leading edge vortex forms on the wing at relatively low angles of attack, on the order of three degrees. The Appendix of reference 1 discusses some of the vortex flow effects. In addition, a shock develops over the aft portion of the wing at transonic speeds such that at some angles of attack, there is both a leading edge vortex and a shock wave on the wing. Such cases are a computational challenge. Some previous applications of this data set have been for the evaluation of an aerodynamic panel method (ref. 7) and for evaluation of a Navier-Stokes capability (ref. 8-10). Linear theory and panel method results are also presented in reference 1, which demonstrated the need for inclusion of transonic effects. Flutter calculations for the related wing with t/c=0.03 are given in references 4 and 11.

In this report several test cases are selected to illustrate trends for a variety of different conditions with emphasis on transonic flow effects. An overview of the model and tests are given, and the standard formulary for these data is listed. All of the data are presented in both tabular and graphical form. Only the static pressures and the 1st harmonic real and imaginary parts of the pressures are available. All of the data for the test are included in a microfiche document in the original report (ref. 1) and are available in electronic file form. The test cases are also available as separate electronic files.

This report provides an early release of test cases that have been proposed for a document that supplements the cases presented in AGARD Report 702 (ref. 12-13) and is being generated under the NATO Research and Technology Organization (RTO) Applied Vehicle Technology (AVT) Working Group - 003. The overall description of the data set is given in the body of this report by a formulary similar to that used in AGARD Report 702.

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Model and Tests

The clipped delta wing model was tested in the NASA Langley Transonic Dynamics Tunnel (TDT). The tunnel has a slotted test section 16-feet (4.064 m) square with cropped corners. At the time of these tests, it could be operated with air or a heavy gas, R-12, as a test medium at pressures from very low to near atmospheric values. Currently the TDT can be operated with air or R-134a as a test medium. An early description of this facility is given in an internal report (NASA LWP-799, Sep. 1969) and the early data system is described in reference 14. More recent descriptions of the facility are given in references 15 and 16, and of the recent data system are given in references 17 and 18. Based on cone transition results (ref. 19-20), the turbulence level for this tunnel is in the average large transonic tunnel category. Some low speed measurements in air have also been presented in reference 21.

The model is shown installed in the TDT in figure 1, the basic structure is illustrated in figure 2, and the overall planform and instrumentation layout is given in figure 3. The model was mounted on a splitter plate offset from the wall. An end plate was fixed to the wing root and moved with the model. To prevent leakage between the end plate and the splitter plate, the region where the splitter plate overlapped the end plate was sealed. The leading edge control surface shown in the figure was fixed and the side edges smoothly faired into the wing. The hinge line at 15 per cent chord was sealed but not smoothed. The trailing-edge control surface (figs. 1-3) had a hinge line at 80 per cent chord which was sealed but not smoothed. The side edges were not sealed. The model was oscillated in pitch as a mass-spring system with a large spring mechanism located behind the tunnel wall that was driven hydraulically. It could be set at various mean angles, and the amplitude and frequency of oscillation varied. The trailing edge control surface was oscillated with a miniature hydraulic actuator located within the wing at the control surface and attached directly to the shaft along the control hinge line.

The wing was constructed with stainless steel ribs and spars and Kevlar-epoxy skins. Although no stiffness measurements were made, it was considered very stiff. Based on accelerometer measurements, the wind-off node lines showed only a modest variation with frequency in the range of interest (fig. 4). The control surface was constructed with ribs, spars, and skin of graphite-epoxy for low weight and high stiffness.

The instrumentation was mostly on the upper surface (shown in fig. 3) with a few transducers on the lower surface to establish symmetry and zero angle of attack. There are 5 chordwise locations for the transducers, with chord C consisting of a few transducers near the edges of the control surfaces. Static and dynamic measurements were made separately, with a static orifice adjacent to each dynamic transducer. The locations of the static orifices are given in table 1, and locations of the orifices for the dynamic transducers are given in table 2. The static pressure tubing was also connected to the reference side of the corresponding dynamic orifices through 35 feet (10.7 m) of .020 inch (.51 mm) diameter tubing to damp out unsteady effects on the reference pressure.

Although ordinates were measured for this wing, it was concluded that the basic definition of a t/c= 0.06 circular arc was adequate to describe the geometry of the wing and the measured ordinates were not published. It was noted (ref. 1) that the control surface had two degrees of twist, which was averaged by setting the inboard portion low and the outboard portion high.

As can been seen in figure 1, the model was tested with the sidewall slots of the test section open. Some recent unpublished results for a model of about twice the root chord of this model and mounted directly to the wind tunnel wall have shown an order of ten percent influence of closing the slots on static lift curve slope (similar to those measured in ref. 22). Significantly less influence would be anticipated for this smaller model which was mounted on a splitter plate.

Test Cases

The static test cases chosen for the clipped delta wing (CDW) are given in table 3, and the dynamic test cases are presented in tables 4 and 5. The code, or point index, for the cases are designated with a two-digit value of the test Mach number, followed by an S for static or D for dynamic, and followed by a sequence number for each Mach number (ref. 1). The test case number is related to the enumeration given in the RTO chapter. The pitch cases are chosen to indicate trends with Mach number at zero angle of attack, trends with Mach number at small values of angle of attack, and trends with angle of attack at one low and one transonic Mach number (including some cases with leading edge vortex flows). The trailing-edge control cases also illustrate trends with Mach number and the static deflection amplitude of the trailing-edge control surface. The dynamic cases are chosen to evaluate unsteady effects at these static conditions. One feature of this data set is a relatively high Reynolds number for the test, of the order of 10×10^6 based on the average chord.

All the data for the static test cases are tabulated and shown in the composite plots in figure 5. The data for the dynamic cases are also tabulated and shown in the plots of figure 6 in terms of in-phase and out-of-phase parts (real and imaginary) of the pressure normalized by the amplitude of the dynamic motion, either pitch or control-surface oscillation (in radians). The phase reference is the input dynamic motion. More figures than are significant are retained in the tables to accurately reproduce the phase angles of the original tabulations. For each of these cases, the data points are connected by straight lines for visual continuity only and the lines are not intended to be considered a fairing of the data.

Note that all of the tests for CDW were conducted with the heavy gas, R-12, as the test medium. The ratio of specific heats, γ, is calculated to be 1.132 to 1.135 for the conditions of the test assuming 0.99 for the fraction of heavy gas in the heavy gas-air mixture. A value of 1.132 is suggested for use in computational comparisons. The corresponding value of Prandtl number is calculated to range from 0.77 to 0.78 for the conditions of this test.

Formulary for the Clipped Delta Wing Data Set

1. General Description of model

1.1	Designation	Clipped Delta Wing (CDW)
1.2	Type	Semispan wing
1.3	Derivation	Simplified version of early SST with thicker airfoil (see Introduction)
1.4	Additional remarks	Shown mounted in tunnel in figure 1
1.5	References	References 1 and 2 are the original source

2. Model Geometry

2.1	Planform	Trapezoidal
2.2	Aspect ratio	1.242 for panel
2.3	Leading edge sweep	50.4 deg.
2.4	Trailing edge sweep	Unswept
2.5	Taper ratio	0.1423
2.6	Twist	None

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2.7	Wing centerline chord	63.55 inches (1614 mm)
2.8	Semi-span of model	45.08 inches (1145 mm)
2.9	Area of planform	1635.88 sq. in. (1.0554 sq. m)
2.10	Location of reference sections and definition of profiles	Reduced frequency based on root semichord, 31.775 inches (807.1 mm)
2.11	Lofting procedure between reference sections	Constant per cent thickness airfoil
2.12	Form of wing-body junction	No fairing, sealed at splitter plate
2.13	Form of wing tip	Sharply cut off
2.14	Control surface details	Trailing edge control, 80% chord between 56.6% span and 82.9% span. Hinge line sealed, but side edges open. About two degrees twist in control surface, with inboard trailing edge low and outboard high
2.15	Additional remarks	See figure 3 for overview
2.16	References	References 1 and 2

3. Wind Tunnel

3.1	Designation	NASA LaRC Transonic Dynamics Tunnel (TDT)
3.2	Type of tunnel	Continuous flow, single return
3.3	Test section dimensions	16 ft x 16 ft (4.064 x 4.064 m)
3.4	Type of roof and floor	Three slots each
3.5	Type of side walls	Two sidewall slots
3.6	Ventilation geometry	Constant width slots in test region
3.7	Thickness of side wall boundary layer	Some documentation in NASA LWP-799. Model tested with splitter plate
3.8	Thickness of boundary layers at roof and floor	Not documented
3.9	Method of measuring velocity	Calculated from static pressures measured in plenum and total pressure measured upstream of entrance nozzle of test section
3.10	Flow angularity	Not documented, considered small
3.11	Uniformity of velocity over test section	Not documented, considered nearly uniform
3.12	Sources and levels of noise or turbulence in empty tunnel	Generally unknown. Some low speed measurements are presented in reference 21. Cone transition measurements are presented in references 19 and 20
3.13	Tunnel resonances	Unknown
3.14	Additional remarks	Tests performed in heavy gas, R-12. Ratio of specific heats, γ, is 1.132-1.135. For computations, 1.132 is recommended. For the conditions of this test, the Prandtl number is calculated to be 0.77-0.78
3.15	References on tunnel	Reference 15, 16, and NASA LWP-799

4. Model Motion

4.1	General description	Pitching about 65.22% of root chord for wing. Oscillation about the control surface hinge line
4.2	Reference coordinate and definition of motion	Pitch about axis normal to freestream. Control surface oscillation about 80% chord line of wing
4.3	Range of amplitude	Pitch amplitude of 0.25 and 0.50 degrees. Control surface oscillation of 2, 4, and 6 degrees
4.4	Range of frequency	4, 8, and 16 Hz for wing pitch, and 8, 16, and 22 Hz for control surface oscillations
4.5	Method of applying motion	Pitch oscillations generated as spring-mass system driven by hydraulic actuator. Control surface oscillations were driven by a miniature hydraulic actuator at the control surface
4.6	Timewise purity of motion	Not documented
4.7	Natural frequencies and normal modes of model and support system	First natural frequency was 28 Hz
4.8	Actual mode of applied motion	Not documented except for node lines for wind-off conditions. See figure 4
4.9	Additional remarks	None

5. Test Conditions

5.1	Model planform area/tunnel area	.05
5.2	Model span/tunnel height	.23
5.3	Blockage	Model less than 0.3%
5.4	Position of model in tunnel	Mounted from splitter plate on wall and in the center of the tunnel
5.5	Range of Mach number	0.40 to 1.12
5.6	Range of tunnel total pressure	530 to 1005 psf (25.4 to 48.1 kPa)
5.7	Range of tunnel total temperature	512 to 576 degrees Rankine (23 to 47° C)
5.8	Range of model steady or mean incidence	0 to 5.5 degrees
5.9	Definition of model incidence	From chord line of symmetric airfoil
5.10	Position of transition, if free	Transition strip used
5.11	Position and type of trip, if transition fixed	Grit strip 0.1 inch wide (2.5 mm) at 8 % chord on upper and lower surfaces. Number 70 grit from root to midspan and number 90 from midspan to tip (number is approximately grains per inch (per 25.4 mm))
5.12	Flow instabilities during tests	None defined
5.13	Changes to mean shape of model due to steady aerodynamic load	Not measured but considered very stiff

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| 5.14 Additional remarks | Tests performed in heavy gas, R-12. Ratio of specific heats, γ, is 1.132-1.135. For computations, 1.132 is recommended. For the conditions of this test, the Prandtl number is calculated to be 0.77-0.78 |
| 5.15 References describing tests | References 1 and 2 |

6. Measurements and Observations

6.1 Steady pressures for the mean conditions	yes
6.2 Steady pressures for small changes from the mean conditions	yes
6.3 Quasi-steady pressures	no
6.4 Unsteady pressures	yes
6.5 Steady section forces for the mean conditions by integration of pressures	no
6.6 Steady section forces for small changes from the mean conditions by integration	no
6.7 Quasi-steady section forces by integration	no
6.8 Unsteady section forces by integration	no
6.9 Measurement of actual motion at points of model	no
6.10 Observation or measurement of boundary layer properties	no
6.11 Visualisation of surface flow	no
6.12 Visualisation of shock wave movements	no
6.13 Additional remarks	no

7. Instrumentation

7.1 Steady pressure

| 7.1.1 Position of orifices spanwise and chordwise | 6 to 16 chordwise locations at 5 spanwise stations. See figure 3 and table 1 |
| 7.1.2 Type of measuring system | Scani-valve |

7.2 Unsteady pressure

7.2.1 Position of orifices spanwise and chordwise	6 to 16 chordwise locations at 5 spanwise stations. See figure 3 and table 2. Slightly different locations than steady
7.2.2 Diameter of orifices	.056 inches (1.4 mm)
7.2.3 Type of measuring system	In situ pressure gages

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	7.2.4 Type of transducers	Kulite
	7.2.5 Principle and accuracy of calibration	Calibrated dynamically using method of reference 23. Also statically calibrated through reference tubes
7.3	Model motion	
	7.3.1 Method of measuring motion reference coordinate	Undocumented
	7.3.2 Method of determining spatial mode of motion	Wind-off verification with accelerometers
	7.3.3 Accuracy of measured motion	Undocumented
7.4	Processing of unsteady measurements	
	7.4.1 Method of acquiring and processing measurements	Analog signals digitized at about 940 samples/sec for 10-30 seconds depending on frequency
	7.4.2 Type of analysis	Fourier analysis
	7.4.3 Unsteady pressure quantities obtained and accuracies achieved	Amplitude and phase of each pressure signal. Accuracy not specified
	7.4.4 Method of integration to obtain forces	None
7.5	Additional remarks	None
7.6	References on techniques	Data system overview for test given in reference 14

8. Data Presentation

8.1	Test cases for which data could be made available	All data are available
8.2	Test cases for which data are included in this document	Sample data tabulated and plotted for each type of test case. Complete plotting and tabulation of each case
8.3	Steady pressures	Available for each test case
8.4	Quasi-steady or steady perturbation pressures	Steady pressures measured for several angles of attack
8.5	Unsteady pressures	Primary data. First harmonic only. No time histories saved. C_p magnitude and phase of reference 1 converted to real and imaginary parts and normalized by amplitude of oscillation (in radians) for this report.
8.6	Steady forces or moments	Some static hinge moments for control surface plotted in reference 1. No other force measurements
8.7	Quasi-steady or unsteady perturbation forces	None
8.8	Unsteady forces and moments	None
8.9	Other forms in which data could be made available	None

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| 8.10 Reference giving other representations of data | References 1-2 and 7-10 |

9. Comments on Data

9.1 Accuracy

	9.1.1 Mach number	Not documented
	9.1.2 Steady incidence	Zero set by pressure difference. Accuracy of other values unknown
	9.1.3 Reduced frequency	Should be accurate
	9.1.4 Steady pressure coefficients	Not documented
	9.1.5 Steady pressure derivatives	None
	9.1.6 Unsteady pressure coefficients	Not documented, but each gage individually calibrated dynamically and monitored statically

9.2 Sensitivity to small changes of parameter	None indicated. Amplitudes of oscillation varied in test
9.3 Non-linearities	Plotted hinge moments (ref. 2) show some nonlinearity. Many flow conditions involve shock waves; some with leading edge vortex flows
9.4 Influence of tunnel total pressure	Not evaluated. Most of the test at constant dynamic pressure
9.5 Effects on data of uncertainty, or variation, in mode of model motion	Unknown; not expected to be appreciable. Wind-off measurements shown in figure 4
9.6 Wall interference corrections	None applied
9.7 Other relevant tests on same model	None
9.8 Relevant tests on other models of nominally the same shapes	Flutter tests on similar planform but thinner airfoil presented in references 4-6, and NASA LWP-872
9.9 Any remarks relevant to comparison between experiment and theory	Leading edge vortex forms near 3 degrees angle of attack. Some cases have both vortex flow and shock waves
9.10 Additional remarks	Wing mostly instrumented on one side. Upper and lower surface data assembled from varying angle of attack
9.11 References on discussion of data	References 1-2 and 7-10

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Concluding Remarks

Steady and unsteady measured pressures for a clipped delta wing undergoing pitching oscillations and trailing-edge control surface oscillations were reviewed. From the several hundred compiled data points, 22 static cases, 12 pitching-oscillation cases, and 12 control-surface-oscillation cases have been proposed for computational test cases to illustrate the trends with Mach number, reduced frequency, and angle of attack. An overview of the model and tests are given, and the standard formulary for these data is listed. All of the data are presented in both tabular and graphical form. This report provides an early release of test cases that have been proposed for a document that supplements the cases presented in AGARD Report 702 and is being generated under the NATO Research and Technology Organization (RTO) Applied Vehicle Technology (AVT) Working Group - 003.

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Table 1. Orifice Locations for Steady Measurements

Chord A	Chord B	Chord C	Chord D	Chord E
y/s				
0.332	0.541	0.587	0.694	0.851
x/c				
0.0778	0.0687	0.0818	0.0675	0.2070
0.1264	0.1282	0.1318	0.1151	0.2559
0.2020	0.2529	0.2099	0.1980	0.3016
0.2523	0.3041	0.7875	0.2559	0.3537
0.3023	0.3531	0.8522	0.3041	0.4583
0.3519	0.4530	0.9017	0.3545	0.5562
0.4510	0.5036	0.9514	0.4537	0.6074
0.5523	0.5534		0.5025	0.6577
0.6025	0.6040		0.5527	0.7071
0.6515	0.6528		0.6038	0.7975
0.6991	0.7030		0.6538	
0.7813	0.7694		0.7025	
0.8505	0.8967		0.7754	
0.9001	0.9512		0.8553	
0.9596			0.9037	
			0.9526	

Table 2. Orifice Locations for Unsteady Measurements

Chord A	Chord B	Chord C	Chord D	Chord E
y/s				
0.337	0.546	0.590	0.698	0.856
x/c				
0.0731	0.0681	0.0767	0.0754	0.1955
0.1120	0.1237	0.1271	0.1237	0.2458
0.1974	0.2485	0.1993	0.1980	0.2915
0.2478	0.3004	0.7802	0.2502	0.3454
0.2987	0.3481	0.8514	0.3001	0.4519
0.3486	0.4487	0.9016	0.3476	0.5497
0.4477	0.4997	0.9511	0.4495	0.6025
0.5506	0.5500		0.4974	0.6545
0.6009	0.6014		0.5484	0.7049
0.6459	0.6494		0.6007	0.7808
0.6979	0.6995		0.6514	
0.7805	0.7747		0.7000	
0.8500	0.8964		0.7795	
0.8996			0.8547	
0.9495			0.9033	
			0.9522	

Table 3. Static Test Cases

Test Case No.	Point (Code[1])	M	α_o deg.	δ_o deg.	Comments
9E1	.40-S-1	.399	.05	0.	vs M, $\alpha_o = 0°$
9E2	.88-S-1	.883	.05	0.	
9E3	.90-S-1	.899	.05	0.	
9E4	.92-S-1	.921	.05	0.	
9E5	.94-S-1	.944	.05	0.	
9E6	.96-S-1	.965	.00	0.	
9E7	1.12-S-1	1.120	.00	0.	

Test Case No.	Point (Code[1])	M	α_o deg.	δ_o deg.	Comments
9E8	.40-S-6	.400	1.03	0.	vs M, $\alpha_o = 1°$
9E9	.90-S-5	.909	.99	0.	
9E10	.94-S-6	.943	.97	0.	
9E11	1.12-S-6	1.120	.99	0.	

Test Case No.	Point (Code[1])	M	α_o deg.	δ_o deg.	Comments
9E12	.40-S-11	.404	3.04	0.	vs α_o @M
9E13	.40-S-15	.403	5.04	0.	
9E14	.90-S-19	.900	2.99	0.	
9E15	.90-S-38	.901	4.24	0.	

Test Case No.	Point (Code[1])	M	α_o deg.	δ_o deg.	Comments
9E16	.40-S-3	.406	.05	4.	vs δ_o, $\alpha_o = 0$
9E17	.90-S-2	.898	.05	2.	
9E18	.90-S-3	.896	.05	4.	
9E19	.94-S-3	.944	.05	4.	
9E20	1.12-S-3	1.120	.00	4.	

Test Case No.	Point (Code[1])	M	α_o deg.	δ_o deg.	Comments
9E21	.90-S-21	.901	2.99	4.	vs δ_o @ α_o
9E22	.90-S-24	.896	2.99	-4.	

[1] Reference 1

Table 4. Test Cases for Pitching Oscillations

Test Case No.	Point (Code[1])	M	α_o deg.	θ deg.	f Hz	k	Comments
9E23	.40-D-5	.403	.05	.47	4.00	.194	vs M
9E24	.88-D-5	.885	.05	.48	7.98	.173	
9E25	.90-D-5	.904	.00	.46	7.99	.167	
9E26	.92-D-5	.921	.05	.47	7.97	.166	
9E27	.94-D-5	.945	.05	.47	7.98	.162	
9E28	.96-D-4	.961	.04	.50	7.99	.158	
9E29	1.12-D-5	1.120	.00	.47	8.00	.136	
9E30	.90-D-2	.905	.00	.24	7.99	.168	Lower θ
9E31	.90-D-4	.904	.00	.50	4.01	.084	Lower k
9E32	.90-D-6	.909	.00	.46	16.01	.335	Higher k
9E33	.40-D-24	.403	5.02	.50	4.00	.189	Higher α_o
9E34	.90-D-29	.902	3.97	.46	7.99	.169	Higher α_o

[1] Reference 1

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Table 5. Test Cases for Control Surface Oscillations

Test Case No.	Point (Code[1])	M	α_o deg.	δ deg.	f Hz	k	Comments
9E35	.40-D-32	.405	.05	3.90	7.99	.376	vs M
9E36	.88-D-34	.878	.05	3.88	16.00	.350	
9E37	.90-D-35	.901	.05	4.00	16.00	.338	
9E38	.92-D-33	.923	.05	3.93	15.98	.337	
9E39	.94-D-34	.942	.05	3.96	15.98	.326	
9E40	.96-D-10	.960	.05	4.54	16.00	.315	
9E41	1.12-D-11	1.120	.00	4.37	16.01	.273	
9E42	.90-D-32	.898	.05	3.48	7.99	.170	Lower k
9E43	.92-D-36	.924	.05	3.89	22.00	.459	Higher k
9E44	.90-D-34	.898	.05	1.97	16.00	.339	Lower δ
9E45	. 90-D-36	.899	.04	5.82	16.01	.340	Higher δ
9E46	.90-D-59	.901	2.99	4.39	16.01	.337	Higher α_o

[1] Reference 1

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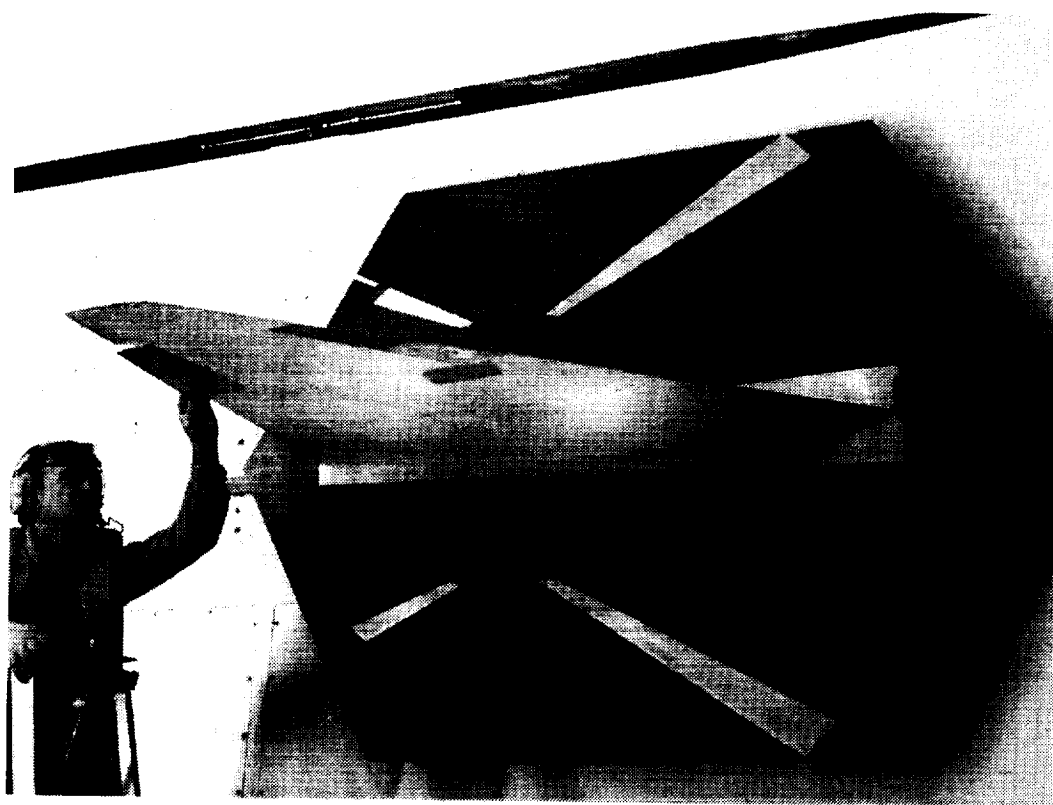
Figure 1. Clipped delta wing installed in wind tunnel.
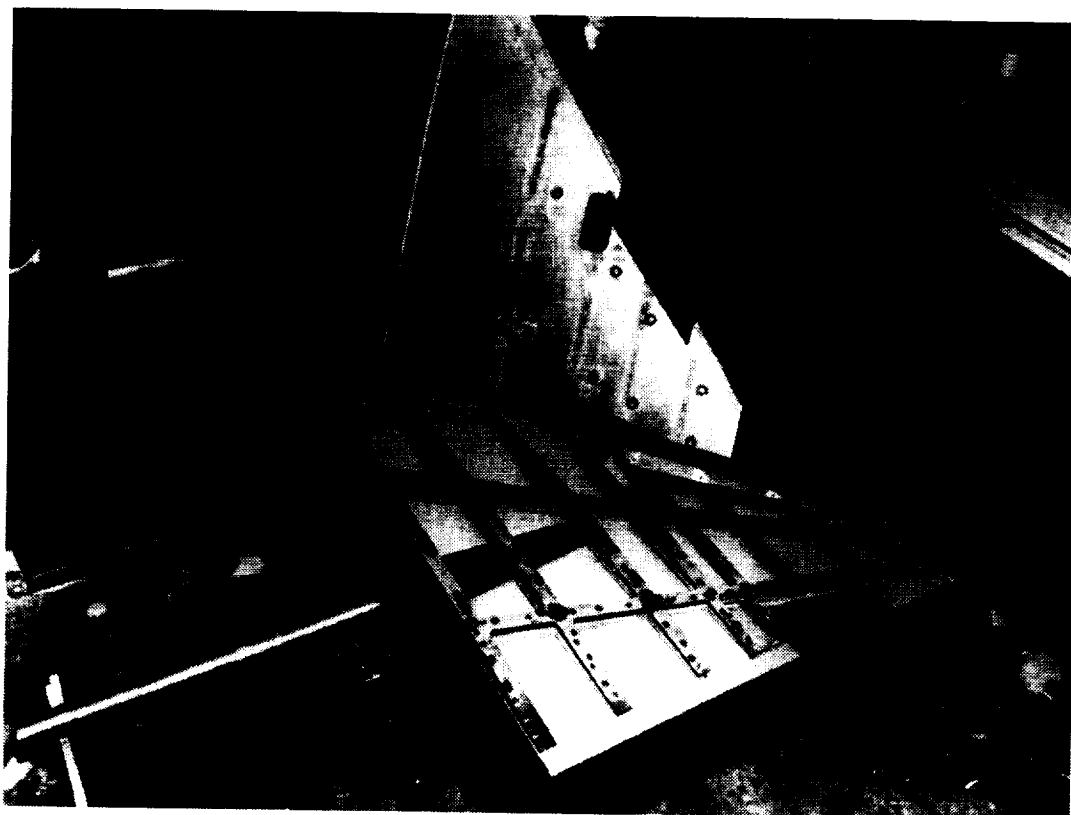
Figure 2. Construction of clipped delta wing.

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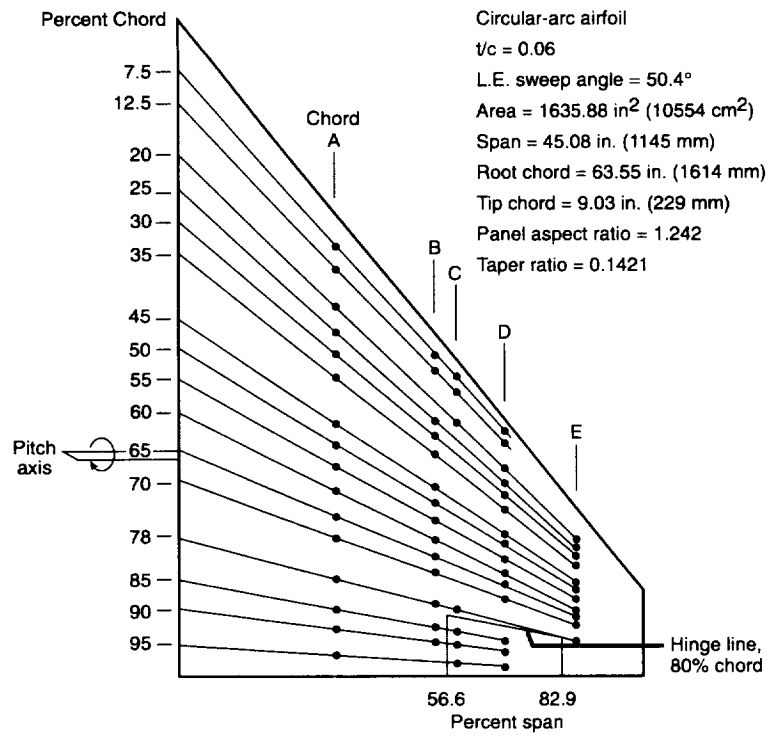
Figure 3. Planform geometry and instrumentation layout.
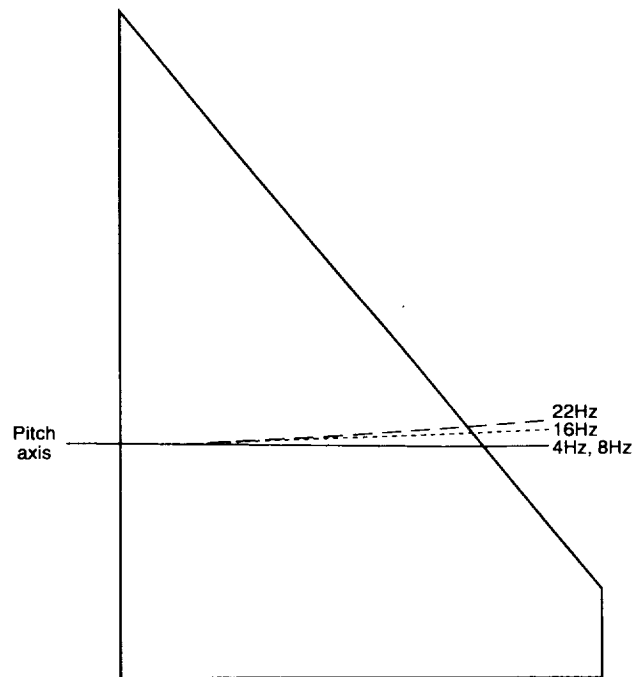
Figure 4. Node lines for test frequencies in still air.

.40-S-1

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.399	82.7	547.5	1004.2	0.05	0.00	0.00	9.35 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.0087		.0687	-.0171		.0818	0.0021		.0675	-.0380		.2070	-.1606	
.1264	-.0499		.1282	-.0654		.1318	-.0548		.1151	-.0360		.2559	-.1677	
.2020	-.0835		.2529	-.1165		.2099	-.1045		.1980	-.1223		.3016	-.1735	
.2523	-.1039		.3041	-.1585		.7875	-.1054		.2559	-.1536		.3537	-.1713	
.3023	-.1277		.3531	-.1591		.8522	-.0568		.3041	-.1480		.4583	-.2187	
.3519	-.1302		.4530	-.1746		.9017	-.0111		.3545	-.1692		.5562	-.1981	
.4510	-.1715		.5036	-.1796		.9514	0.0357		.4537	-.2052		.6074	-.1778	
.5523	-.1513		.5534	-.1715					.5025	-.1918		.6577	-.1767	
.6025	-.1655		.6040	-.1781					.5527	-.1844		.7071	-.1570	
.6515	-.1848		.6528	-.1619					.6038	-.1793		.7975	-.0925	
.6991	-.1643		.7030	-.1449					.6538	-.1761				
.7813	-.1205		.7694	-.1072					.7025	-.1683				
.8505	-.0693		.8967	-.0068					.7754	-.0830				
.9001	-.0404								.8553	-.0589				
.9596	0.0306								.9037	-.0225				
									.9526	0.0391				

.40-S-1

(a) Test case 9E1 (point .40-S-1)
Figure 5. Static test cases.

.88-S-1

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.883	185.0	557.9	664.7	0.05	0.00	0.00	9.79 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0129		.0687	-.0024		.0818	0.0134		.0675	-.0573		.2070	-.2601	
.1264	-.0387		.1282	-.0796		.1318	-.0634		.1151	-.0593		.2559	-.2811	
.2020	-.0854		.2529	-.1546		.2099	-.1465		.1980	-.1739		.3016	-.2757	
.2523	-.1158		.3041	-.2222		.7875	-.1580		.2559	-.2315		.3537	-.2924	
.3023	-.1582		.3531	-.2383		.8522	-.0842		.3041	-.2399		.4583	-.3823	
.3519	-.1620		.4530	-.2805		.9017	0.0045		.3545	-.2762		.5562	-.3760	
.4510	-.2440		.5036	-.3066		.9514	0.0852		.4537	-.3545		.6074	-.3218	
.5523	-.2405		.5534	-.3018					.5025	-.3482		.6577	-.2911	
.6025	-.2843		.6040	-.3225					.5527	-.3403		.7071	-.2423	
.6515	-.3385		.6528	-.3155					.6038	-.3379		.7975	-.1120	
.6991	-.2958		.7030	-.2779					.6538	-.3279				
.7813	-.2194		.7694	-.1803					.7025	-.3024				
.8505	-.1116		.8967	0.0020					.7754	-.1276				
.9001	-.0472								.8553	-.0779				
.9596	0.0666								.9037	-.0013				
									.9526	0.0880				
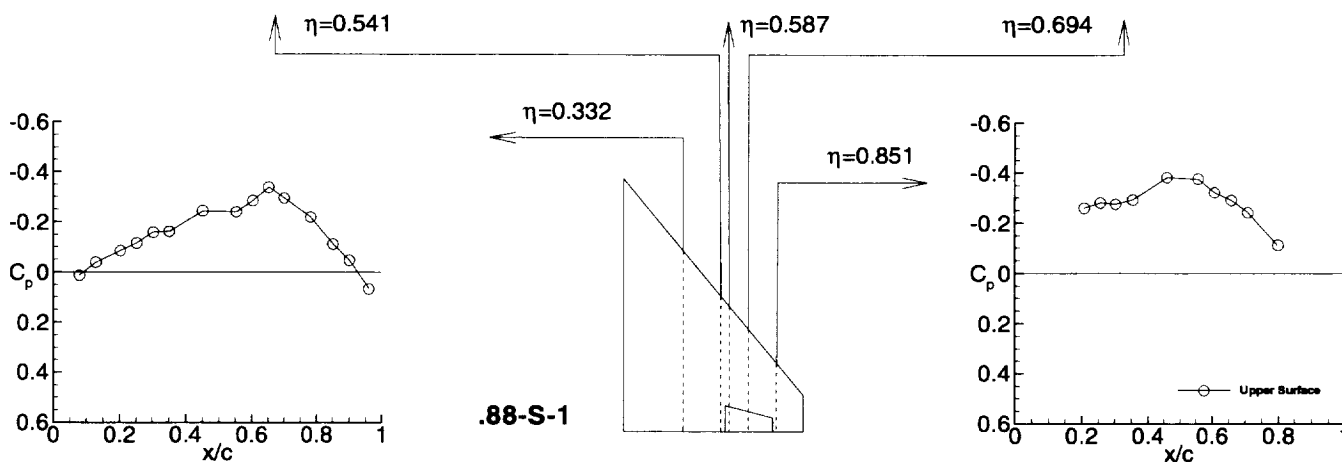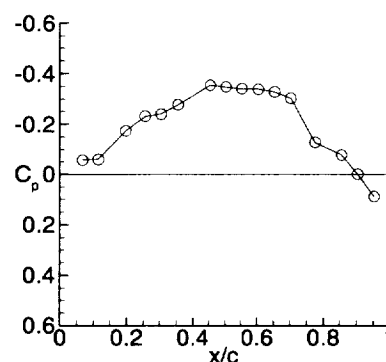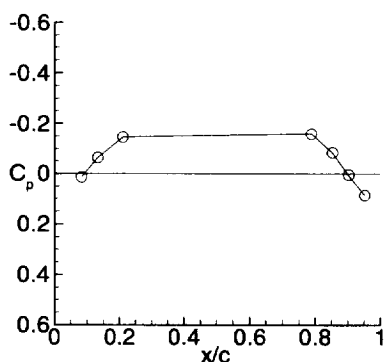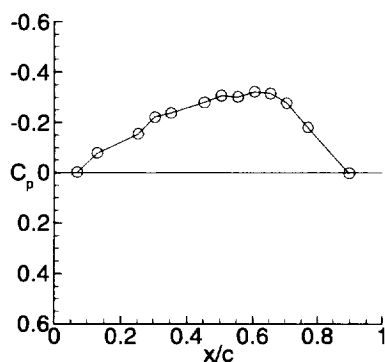
(b) Test case 9E2 (point .88-S-1)
Figure 5. Continued.

.90-S-1

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.899	191.2	565.3	651.8	0.05	0.00	0.00	9.77 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0217		.0687	0.0049		.0818	0.0229		.0675	-.0528		.2070	-.2689	
.1264	-.0318		.1282	-.0788		.1318	-.0596		.1151	-.0572		.2559	-.3260	
.2020	-.0802		.2529	-.1548		.2099	-.1477		.1980	-.1748		.3016	-.2912	
.2523	-.1134		.3041	-.2251		.7875	-.1491		.2559	-.2408		.3537	-.3057	
.3023	-.1580		.3531	-.2484		.8522	-.0710		.3041	-.2481		.4583	-.4098	
.3519	-.1620		.4530	-.2859		.9017	0.0186		.3545	-.2905		.5562	-.4368	
.4510	-.2456		.5036	-.3258		.9514	0.0988		.4537	-.3831		.6074	-.3943	
.5523	-.2424		.5534	-.3261					.5025	-.3628		.6577	-.3388	
.6025	-.3011		.6040	-.3542					.5527	-.3760		.7071	-.2408	
.6515	-.3778		.6528	-.3646					.6038	-.3990		.7975	-.0879	
.6991	-.3374		.7030	-.3350					.6538	-.3987				
.7813	-.2514		.7694	-.1980					.7025	-.3588				
.8505	-.1069		.8967	0.0138					.7754	-.1191				
.9001	-.0362								.8553	-.0617				
.9596	0.0812								.9037	0.0126				
									.9526	0.0999				

(c) Test case 9E3 (point .90-S-1)
Figure 5. Continued.

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.92-S-1

MACH	q	To	H	ALPHAo	THETA	DELTA	RN
	psf	deg R	psf	deg	deg	deg	
0.921	193.8	541.7	643.0	0.05	0.00	0.00	10.35 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0217		.0687	0.0082		.0818	0.0191		.0675	-.0474		.2070	-.2554	
.1264	-.0319		.1282	-.0762		.1318	-.0570		.1151	-.0568		.2559	-.3334	
.2020	-.0808		.2529	-.1519		.2099	-.1505		.1980	-.1757		.3016	-.3093	
.2523	-.1094		.3041	-.2232		.7875	-.2268		.2559	-.2463		.3537	-.3472	
.3023	-.1542		.3531	-.2526		.8522	-.0447		.3041	-.2500		.4583	-.4356	
.3519	-.1557		.4530	-.3013		.9017	0.0449		.3545	-.3058		.5562	-.4798	
.4510	-.2504		.5036	-.3205		.9514	0.1231		.4537	-.3916		.6074	-.4883	
.5523	-.2577		.5534	-.3423					.5025	-.3836		.6577	-.5421	
.6025	-.3150		.6040	-.3669					.5527	-.3955		.7071	-.5585	
.6515	-.3970		.6528	-.4097					.6038	-.4273		.7975	-.0423	
.6991	-.3945		.7030	-.4424					.6538	-.4884				
.7813	-.3789		.7694	-.3641					.7025	-.5344				
.8505	-.1054		.8967	0.0296					.7754	-.2269				
.9001	-.0228								.8553	-.0245				
.9596	0.0899								.9037	0.0519				
									.9526	0.1326				
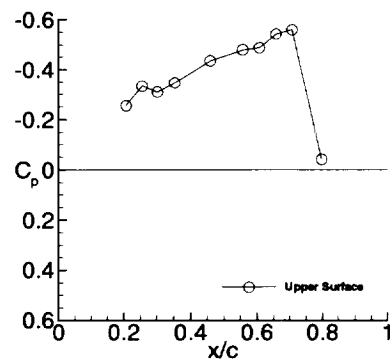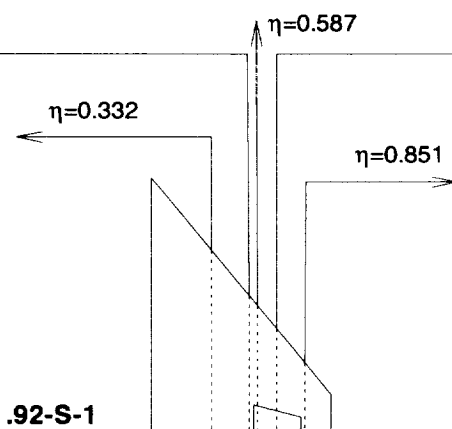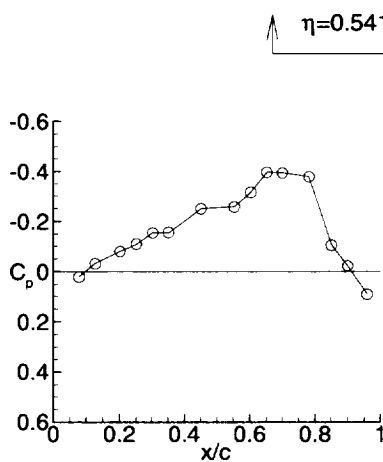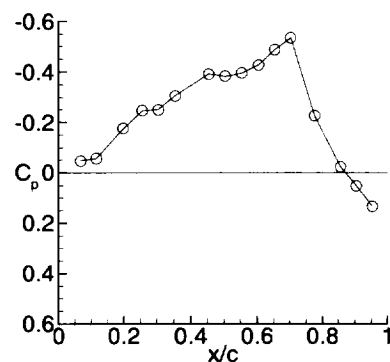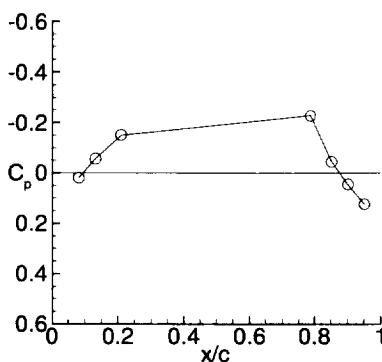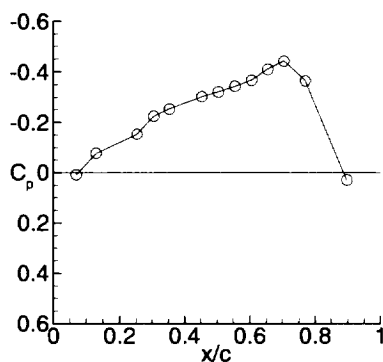
(d) Test case 9E4 (point .92-S-1)
Figure 5. Continued.

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.94-S-1

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.944	203.7	562.5	658.6	0.05	0.00	0.00	10.07 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0308		.0687	0.0127		.0818	0.0247		.0675	-.0634		.2070	-.2318	
.1264	-.0194		.1282	-.0748		.1318	-.0529		.1151	-.0441		.2559	-.3292	
.2020	-.0646		.2529	-.1391		.2099	-.1415		.1980	-.1427		.3016	-.3091	
.2523	-.0975		.3041	-.2057		.7875	-.5282		.2559	-.2259		.3537	-.3454	
.3023	-.1437		.3531	-.2389		.8522	-.2280		.3041	-.2341		.4583	-.4238	
.3519	-.1407		.4530	-.3048		.9017	0.0243		.3545	-.2999		.5562	-.4757	
.4510	-.2367		.5036	-.3202		.9514	0.1309		.4537	-.3829		.6074	-.4682	
.5523	-.2463		.5534	-.3378					.5025	-.3786		.6577	-.5219	
.6025	-.3079		.6040	-.3610					.5527	-.3794		.7071	-.5971	
.6515	-.3965		.6528	-.3961					.6038	-.4140		.7975	-.4958	
.6991	-.3988		.7030	-.4429					.6538	-.4682				
.7813	-.4019		.7694	-.4591					.7025	-.5219				
.8505	-.2776		.8967	0.0103					.7754	-.5178				
.9001	-.0161								.8553	-.1340				
.9596	0.1086								.9037	0.0448				
									.9526	0.1434				
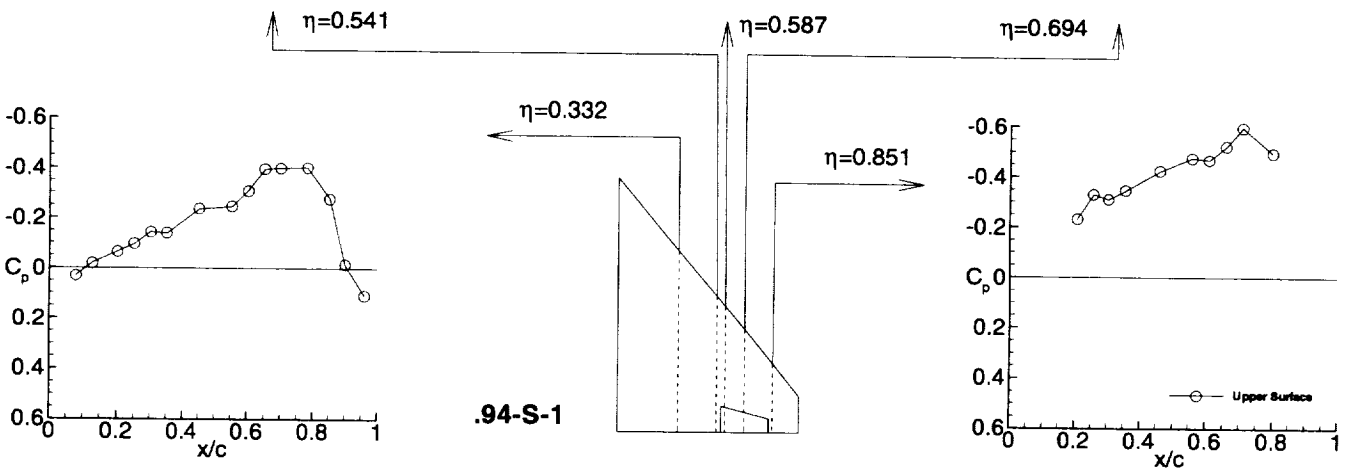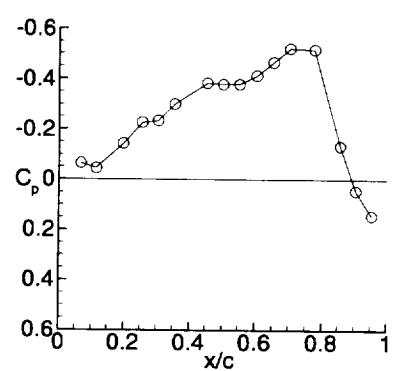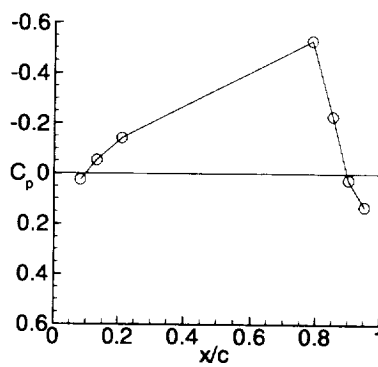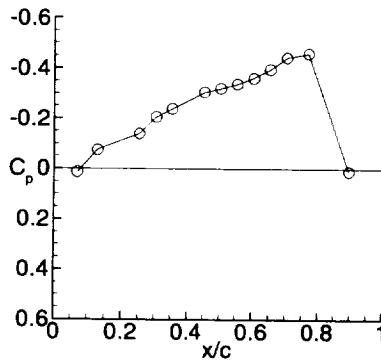
(e) Test case 9E5 (point .94-S-1)
Figure 5. Continued.

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.96-S-1

MACH	q	To	H	ALPHAo	THETA	DELTA	RN
	psf	deg R	psf	deg	deg	deg	
0.965	197.1	551.9	622.7	0.00	0.00	0.00	9.81 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0406		.0687	0.0168		.0818	0.0000		.0675	-.0292		.2070	-.2062	
.1264	-.0101		.1282	-.0619		.1318	0.0292		.1151	-.0256		.2559	-.3023	
.2020	-.0563		.2529	-.1240		.2099	-.0438		.1980	-.1202		.3016	-.2895	
.2523	-.0879		.3041	-.1880		.7875	-.1260		.2559	-.2021		.3537	-.3265	
.3023	-.1357		.3531	-.2271		.8522	-.5373		.3041	-.2050		.4583	-.3903	
.3519	-.1331		.4530	-.2880		.9017	-.4922		.3545	-.2674		.5562	-.4357	
.4510	-.2233		.5036	-.3101		.9514	-.1113		.4537	-.3558		.6074	-.4289	
.5523	-.2347		.5534	-.3237					.5025	-.3544		.6577	-.4752	
.6025	-.2917		.6040	-.3481					.5527	-.3592		.7071	-.5483	
.6515	-.3782		.6528	-.3862					.6038	-.3839		.7975	-.5919	
.6991	-.3859		.7030	-.4291					.6538	-.4336				
.7813	-.4142		.7694	-.4497					.7025	-.4804				
.8505	-.3854		.8967	-.1723					.7754	-.4802				
.9001	-.2732								.8553	-.5194				
.9596	0.0737								.9037	-.1035				
									.9526	0.0569				
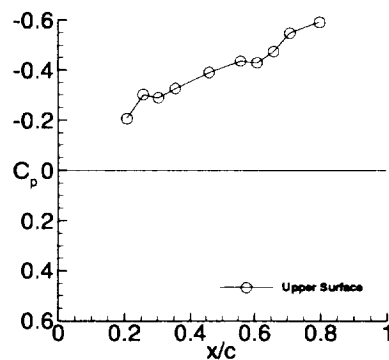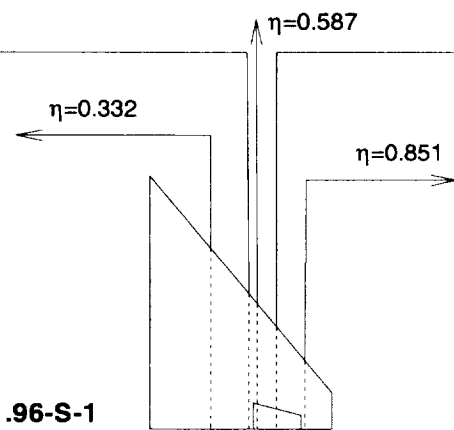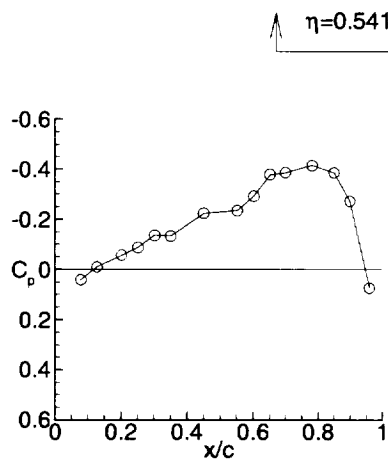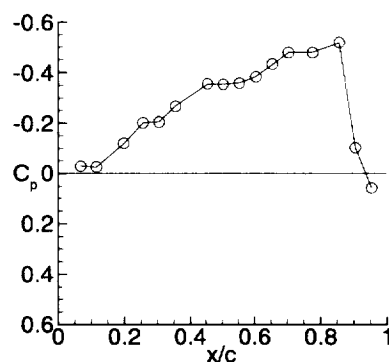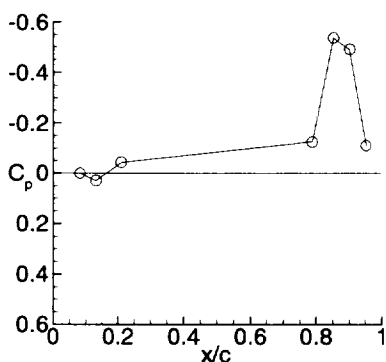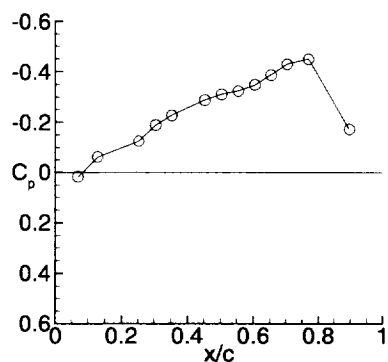
(f) Test case 9E6 (point .96-S-1)
Figure 5. Continued.

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1.12-S-1

	MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
	1.120	230.4	572.5	641.3	0.00	0.00	0.00	9.68 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0390		.0687	0.0788		.0818	0.1764		.0675	0.1085		.2070	-.0404	
.1264	0.0009		.1282	0.0835		.1318	0.0641		.1151	0.1227		.2559	-.1160	
.2020	-.0850		.2529	0.0226		.2099	0.0217		.1980	0.0268		.3016	-.1110	
.2523	-.0297		.3041	-.0251		.7875	-.3866		.2559	-.0488		.3537	-.1521	
.3023	0.0019		.3531	-.0850		.8522	-.3064		.3041	-.0561		.4583	-.2113	
.3519	-.0075		.4530	-.1552		.9017	-.3195		.3545	-.1147		.5562	-.2708	
.4510	-.1001		.5036	-.1865		.9514	-.3628		.4537	-.2013		.6074	-.2705	
.5523	-.1053		.5534	-.1931					.5025	-.2034		.6577	-.2948	
.6025	-.1419		.6040	-.1813					.5527	-.2183		.7071	-.3437	
.6515	-.2208		.6528	-.2036					.6038	-.2191		.7975	-.3818	
.6991	-.2397		.7030	-.2572					.6538	-.2427				
.7813	-.2473		.7694	-.2931					.7025	-.2738				
.8505	-.2820		.8967	-.2820					.7754	-.2824				
.9001	-.3232								.8553	-.3126				
.9596	-.3378								.9037	-.3498				
									.9526	-.3612				
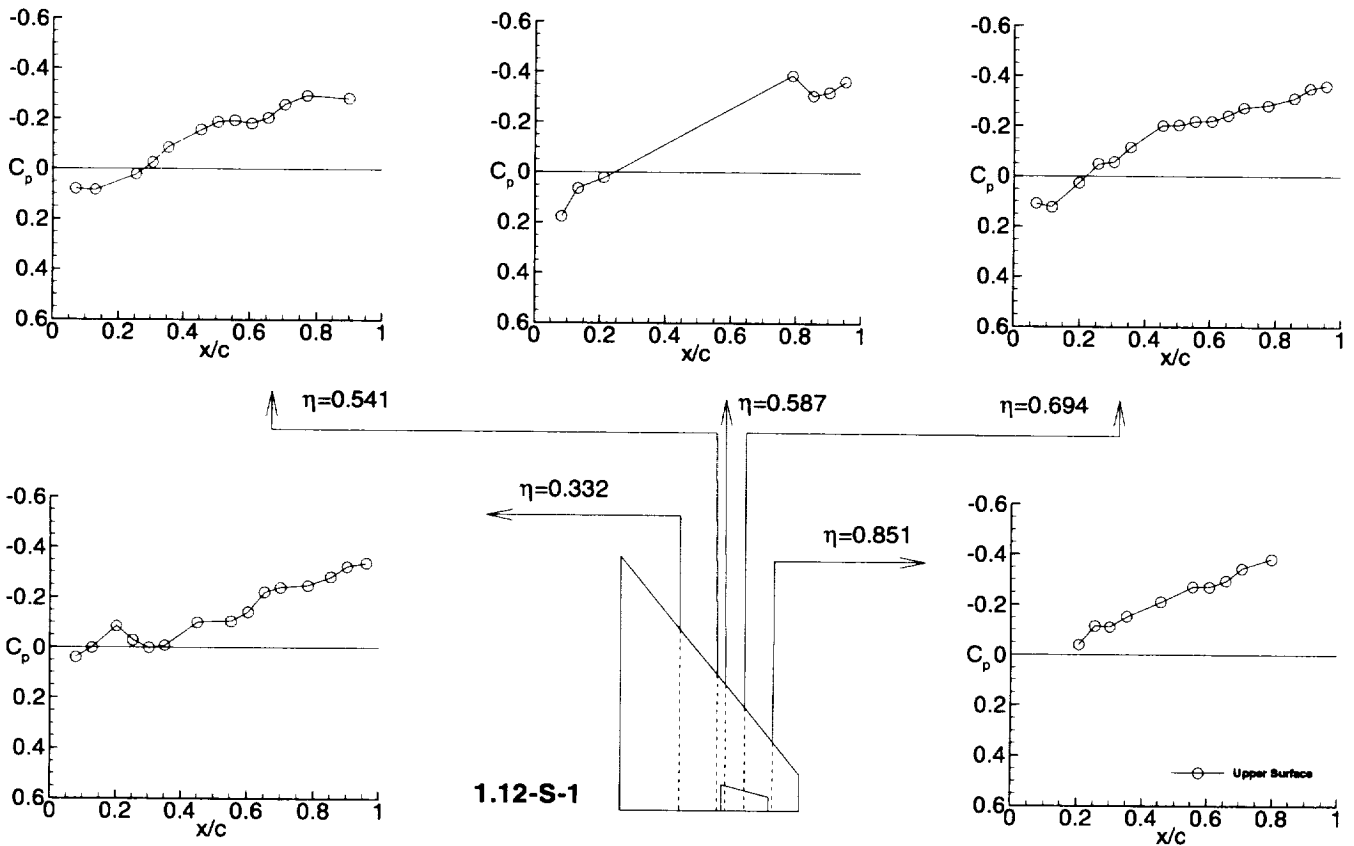
(g) Test case 9E7 (point 1.12-S-1)
Figure 5. Continued.

.40-S-6

MACH	q	To	H	ALPHAo	THETA	DELTA	RN
	psf	deg R	psf	deg	deg	deg	
0.400	76.4	520.7	917.9	1.03	0.00	0.00	9.21 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.0606	0.0350	.0687	-.0849	0.0422	.0818	-.0679	0.0611	.0675	-.1157	0.0362	.2070	-.2159	-.1115
.1264	-.0960	-.0171	.1282	-.1202	-.0186	.1318	-.1121	-.0071	.1151	-.1060	0.0207	.2559	-.2203	-.1270
.2020	-.1259	-.0615	.2529	-.1554	-.0855	.2099	-.1493	-.0694	.1980	-.1751	-.0793	.3016	-.2205	-.1386
.2523	-.1391	-.0815	.3041	-.1940	-.1329	.7875	-.1168	-.1076	.2559	-.1967	-.1174	.3537	-.2113	-.1414
.3023	-.1616	-.1103	.3531	-.1916	-.1360	.8522	-.0643	-.0557	.3041	-.1884	-.1157	.4583	-.2509	-.1990
.3519	-.1636	-.1167	.4530	-.2015	-.1566	.9017	-.0142	-.0078	.3545	-.2072	-.1431	.5562	-.2201	-.1818
.4510	-.1991	-.1616	.5036	-.2062	-.1675	.9514	0.0354	0.0366	.4537	-.2348	-.1845	.6074	-.1982	-.1668
.5523	-.1739	-.1438	.5534	-.1919	-.1579				.5025	-.2195	-.1754	.6577	-.1943	-.1690
.6025	-.1867	-.1591	.6040	-.1976	-.1689				.5527	-.2092	-.1719	.7071	-.1679	-.1489
.6515	-.2023	-.1816	.6528	-.1795	-.1548				.6038	-.1966	-.1650	.7975	-.1052	-.0943
.6991	-.1836	-.1632	.7030	-.1608	-.1399				.6538	-.1959	-.1700			
.7813	-.1325	-.1206	.7694	-.1186	-.1041				.7025	-.1838	-.1641			
.8505	-.0784	-.0719	.8967	-.0109	-.0028				.7754	-.1025	-.0908			
.9001	-.0491	-.0453							.8553	-.0634	-.0537			
.9596	0.0211	0.0217							.9037	-.0222	-.0171			
									.9526	0.0420	0.0428			
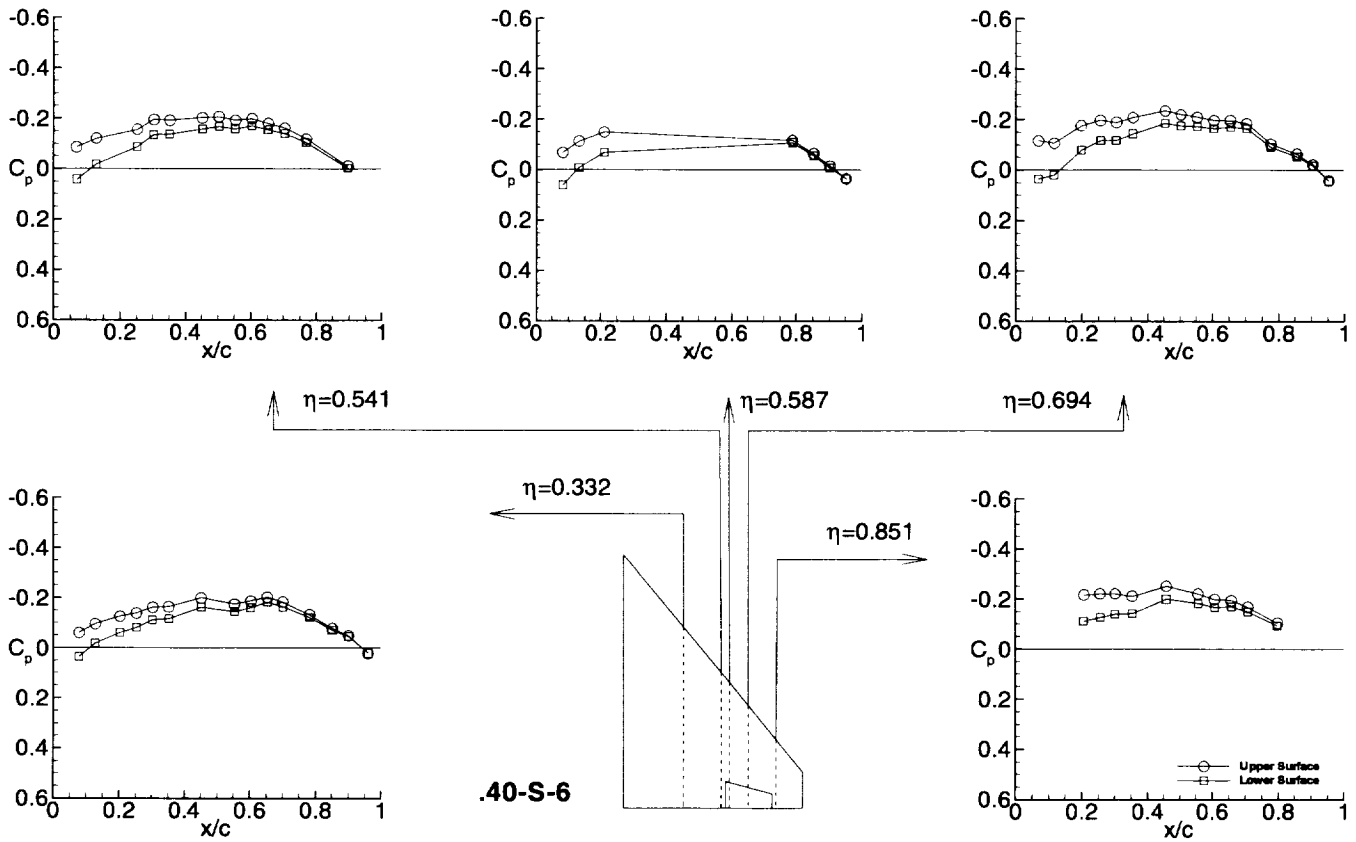
(h) Test case 9E8 (point .40-S-6)
Figure 5.   Continued.

.90-S-5

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.909	199.7	565.7	673.5	0.99	0.00	0.00	10.11 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.0262	0.0596	.0687	-.0690	0.0538	.0818	-.0645	0.0574	.0675	-.1294	0.0129	.2070	-.3019	-.1935
.1264	-.0691	0.0054	.1282	-.1348	-.0329	.1318	-.1268	-.0199	.1151	-.1243	-.0012	.2559	-.3715	-.2193
.2020	-.1102	-.0437	.2529	-.1952	-.1177	.2099	-.1917	-.0993	.1980	-.2125	-.1118	.3016	-.3500	-.2201
.2523	-.1396	-.0791	.3041	-.2543	-.1866	.7875	-.1370	-.1512	.2559	-.2745	-.1813	.3537	-.3783	-.2444
.3023	-.1813	-.1234	.3531	-.2847	-.2077	.8522	-.0641	-.0769	.3041	-.2789	-.1907	.4583	-.4422	-.3401
.3519	-.1813	-.1321	.4530	-.3320	-.2548	.9017	0.0198	0.0115	.3545	-.3310	-.2317	.5562	-.4631	-.3798
.4510	-.2716	-.2225	.5036	-.3444	-.2852	.9514	0.0987	0.0900	.4537	-.4056	-.3191	.6074	-.3721	-.3422
.5523	-.2809	-.2219	.5534	-.3688	-.2911				.5025	-.4022	-.3126	.6577	-.2869	-.3006
.6025	-.3365	-.2759	.6040	-.3902	-.3178				.5527	-.4019	-.3218	.7071	-.2038	-.2310
.6515	-.4083	-.3421	.6528	-.4118	-.3209				.6038	-.4349	-.3374	.7975	-.0827	-.0986
.6991	-.3860	-.3046	.7030	-.3550	-.2967				.6538	-.4644	-.3366			
.7813	-.2561	-.2384	.7694	-.1759	-.1819				.7025	-.3958	-.3200			
.8505	-.0940	-.1083	.8967	0.0129	0.0079				.7754	-.0879	-.1127			
.9001	-.0218	-.0410							.8553	-.0423	-.0702			
.9596	0.0903	0.0756							.9037	0.0209	0.0013			
									.9526	0.1017	0.0858			
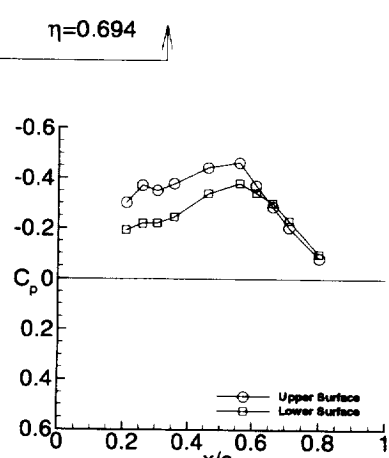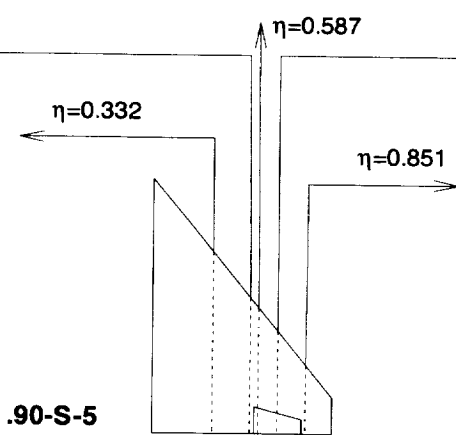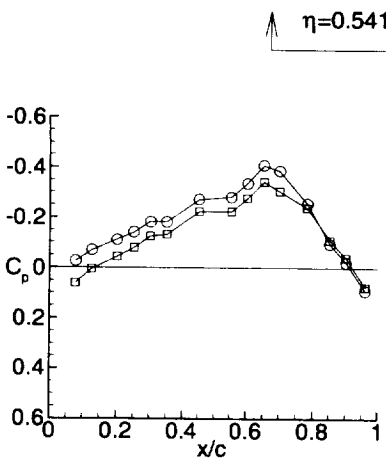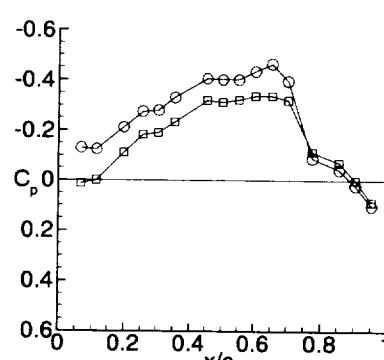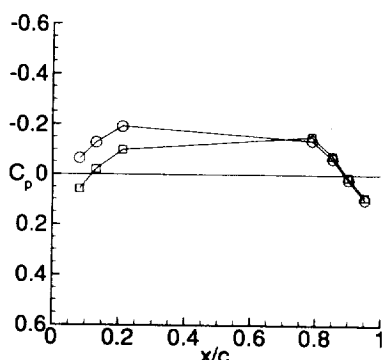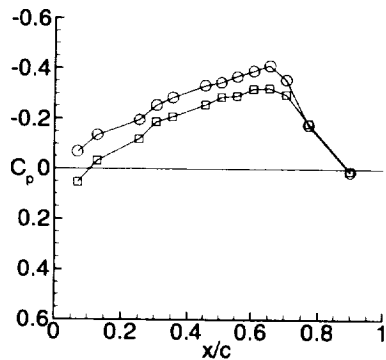
(i) Test case 9E9 (point .90-S-5)
Figure 5. Continued.

26

.94-S-6

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.943	199.9	557.1	647.4	0.97	0.00	0.00	10.04 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.0158	0.0757	.0687	-.0517	0.0726	.0818	-.0424	0.0896	.0675	-.1383	0.0304	.2070	-.3004	-.1898
.1264	-.0574	0.0206	.1282	-.1249	-.0156	.1318	-.1050	0.0013	.1151	-.1135	0.0111	.2559	-.3940	-.2685
.2020	-.0995	-.0284	.2529	-.1779	-.1009	.2099	-.1851	-.0919	.1980	-.1977	-.1072	.3016	-.3716	-.2358
.2523	-.1285	-.0637	.3041	-.2363	-.1723	.7875	-.5582	-.4994	.2559	-.2727	-.1903	.3537	-.4139	-.2762
.3023	-.1735	-.1101	.3531	-.2708	-.2069	.8522	-.1636	-.2868	.3041	-.2709	-.1947	.4583	-.4777	-.3664
.3519	-.1694	-.1100	.4530	-.3348	-.2673	.9017	0.0316	0.0128	.3545	-.3394	-.2537	.5562	-.5310	-.4248
.4510	-.2606	-.2082	.5036	-.3546	-.2850	.9514	0.1340	0.1233	.4537	-.4323	-.3389	.6074	-.5161	-.4330
.5523	-.2704	-.2231	.5534	-.3628	-.3084				.5025	-.4228	-.3323	.6577	-.5564	-.4890
.6025	-.3350	-.2812	.6040	-.3926	-.3286				.5527	-.4323	-.3419	.7071	-.6272	-.5743
.6515	-.4160	-.3717	.6528	-.4280	-.3728				.6038	-.4543	-.3807	.7975	-.3637	-.6065
.6991	-.4284	-.3689	.7030	-.4704	-.4149				.6538	-.5088	-.4356			
.7813	-.4348	-.3779	.7694	-.4916	-.4311				.7025	-.5531	-.4897			
.8505	-.2559	-.3522	.8967	0.0125	-.0133				.7754	-.5530	-.4871			
.9001	-.0082	-.0473							.8553	-.1171	-.3281			
.9596	0.1140	0.1016							.9037	0.0482	0.0075			
									.9526	0.1420	0.1256			
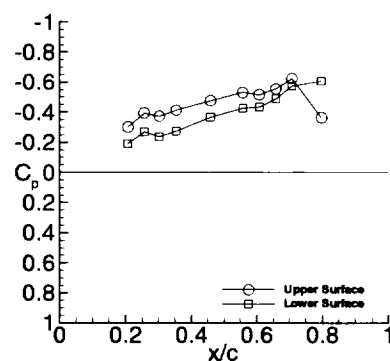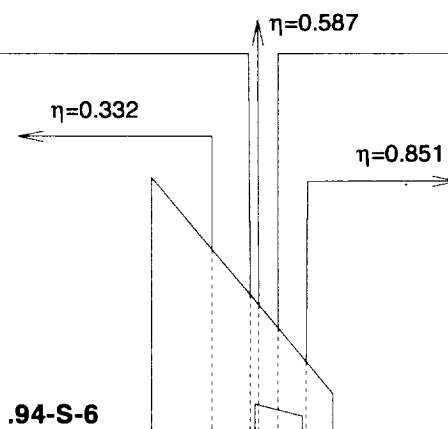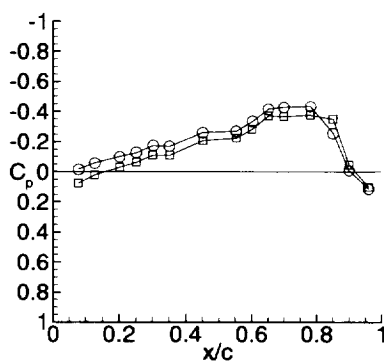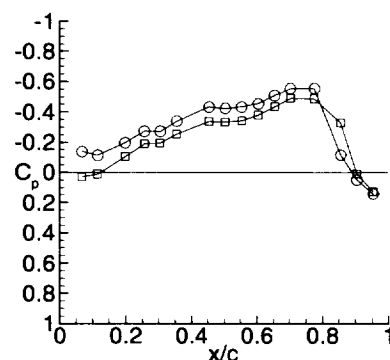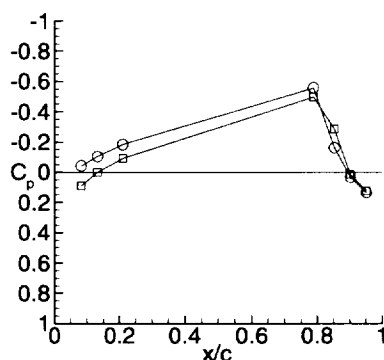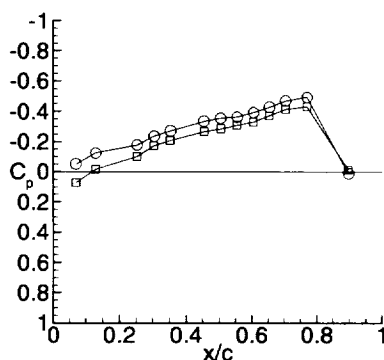
(j) Test case 9E10 (point .94-S-6)
Figure 5. Continued.

1.12-S-6

	MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
	1.120	231.7	573.2	643.0	0.99	0.00	0.00	9.70 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0002	0.0687	.0687	-.0344	0.1603	.0818	0.1021	0.2178	.0675	0.0747	0.1675	.2070	-.1112	0.0090
.1264	-.0359	0.0310	.1282	0.0308	0.1083	.1318	0.0254	0.1111	.1151	0.0639	0.1652	.2559	-.1755	-.0665
.2020	-.1181	-.0455	.2529	-.0189	0.0472	.2099	-.0196	0.0600	.1980	-.0265	0.0651	.3016	-.1644	-.0628
.2523	-.0724	-.0126	.3041	-.0689		.7875	-.3982	-.3602	.2559	-.0993	-.0136	.3537	-.1946	-.1025
.3023	-.0358	0.0219	.3531	-.1262	-.0563	.8522	-.3249	-.2861	.3041	-.1080	-.0190	.4583	-.2489	-.1624
.3519	-.0508	0.0087	.4530	-.1788	-.1177	.9017	-.3357	-.3083	.3545	-.1590	-.0793	.5562	-.3082	-.2244
.4510	-.1117	-.0751	.5036	-.2067	-.1523	.9514	-.3716	-.3500	.4537	-.2337	-.1669	.6074	-.3069	-.2226
.5523	-.1184	-.0738	.5534	-.2185	-.1547				.5025	-.2343	-.1695	.6577	-.3305	-.2430
.6025	-.1543	-.1101	.6040	-.2113	-.1435				.5527	-.2519	-.1790	.7071	-.3696	-.2866
.6515	-.2284	-.1972	.6528	-.2181	-.1827				.6038	-.2546	-.1742	.7975	-.3998	-.3446
.6991	-.2506	-.2146	.7030	-.2712	-.2370				.6538	-.2662	-.1952			
.7813	-.2627	-.2268	.7694	-.3125	-.2711				.7025	-.2943	-.2469			
.8505	-.2916	-.2619	.8967	-.2984	-.2639				.7754	-.2918	-.2542			
.9001	-.3354	-.3002							.8553	-.3197	-.2909			
.9596	-.3547	-.3237							.9037	-.3595	-.3263			
									.9526	-.3793	-.3481			

(k) Test case 9E11 (point 1.12-S-6)
Figure 5. Continued.

.40-S-11

MACH	q	To	H	ALPHAo	THETA	DELTA	RN
	psf	deg R	psf	deg	deg	deg	
0.404	78.4	525.7	926.7	3.04	0.00	0.00	9.25 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.1330	0.1201	.0687	-.1980	0.1449	.0818	-.2427	0.1639	.0675	-.4058	0.1537	.2070	-.2425	-.0150
.1264	-.1637	0.0606	.1282	-.1752	0.0698	.1318	-.2252	0.0828	.1151	-.2339	0.1191	.2559	-.2617	-.0385
.2020	-.1821	0.0061	.2529	-.2119	-.0209	.2099	-.2341	0.0054	.1980	-.2561	0.0098	.3016	-.2644	-.0584
.2523	-.1908	-.0217	.3041	-.2460	-.0712	.7875	-.1256	-.0937	.2559	-.2722	-.0399	.3537	-.2515	-.0719
.3023	-.2078	-.0533	.3531	-.2346	-.0795	.8522	-.0741	-.0409	.3041	-.2466	-.0451	.4583	-.2868	-.1414
.3519	-.2038	-.0627	.4530	-.2324	-.1106	.9017	-.0237	-.0007	.3545	-.2619	-.0781	.5562	-.2456	-.1415
.4510	-.2314	-.1169	.5036	-.2336	-.1235	.9514	0.0247	0.0374	.4537	-.2811	-.1296	.6074	-.2167	-.1313
.5523	-.1983	-.1083	.5534	-.2147	-.1192				.5025	-.2540	-.1255	.6577	-.2099	-.1393
.6025	-.2080	-.1276	.6040	-.2182	-.1347				.5527	-.2405	-.1278	.7071	-.1801	-.1271
.6515	-.2208	-.1529	.6528	-.1949	-.1254				.6038	-.2239	-.1281	.7975	-.1143	-.0816
.6991	-.1976	-.1364	.7030	-.1733	-.1143				.6538	-.2151	-.1354			
.7813	-.1411	-.1009	.7694	-.1272	-.0861				.7025	-.1971	-.1357			
.8505	-.0848	-.0559	.8967	-.0128	0.0073				.7754	-.1091	-.0651			
.9001	-.0530	-.0327							.8553	-.0682	-.0436			
.9596	0.0169	0.0326							.9037	-.0283	-.0145			
									.9526	0.0365	0.0413			
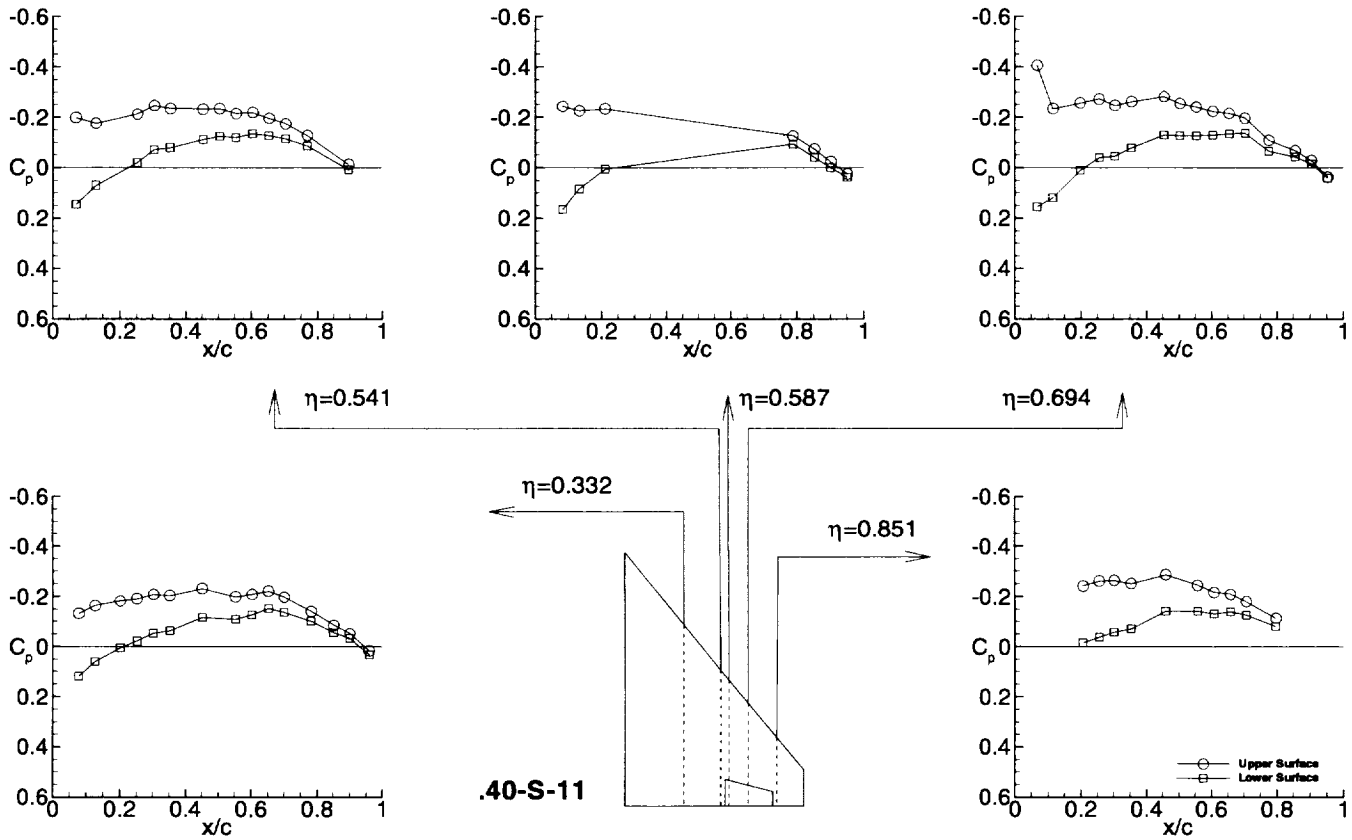
(1) Test case 9E12 (point .40-S-11)
Figure 5. Continued

.40-S-15

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.403	78.3	527.8	932.6	5.04	0.00	0.00	9.22 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.6229	0.1941	.0687	-.7877	0.2235	.0818	-.7238	0.2412	.0675	-.8612	0.2418	.2070	-.8880	0.0579
.1264	-.2071	0.1290	.1282	-.5636	0.1459	.1318	-.6417	0.1576	.1151	-.8373	0.1997	.2559	-.8129	0.0288
.2020	-.2202	0.0656	.2529	-.3000	0.0395	.2099	-.4225	0.0722	.1980	-.5840	0.0835	.3016	-.7029	0.0038
.2523	-.2370	0.0324	.3041	-.3036	-.0155	.7875	-.1356	-.0836	.2559	-.4013	0.0269	.3537	-.5700	-.0165
.3023	-.2530	-.0025	.3531	-.2881	-.0279	.8522	-.0805	-.0303	.3041	-.2984	0.0170	.4583	-.3340	-.0959
.3519	-.2492	-.0170	.4530	-.2741	-.0672	.9017	-.0297	0.0046	.3545	-.2779	-.0204	.5562	-.2269	-.1080
.4510	-.2700	-.0770	.5036	-.2725	-.0860	.9514	0.0215	0.0356	.4537	-.2826	-.0820	.6074	-.1893	-.1044
.5523	-.2317	-.0766	.5534	-.2512	-.0867				.5025	-.2613	-.0837	.6577	-.1703	-.1182
.6025	-.2370	-.0999	.6040	-.2500	-.1053				.5527	-.2500	-.0909	.7071	-.1469	-.1126
.6515	-.2448	-.1277	.6528	-.2220	-.0987				.6038	-.2319	-.0962	.7975	-.0969	-.0807
.6991	-.2181	-.1158	.7030	-.1965	-.0928				.6538	-.2225	-.1083			
.7813	-.1577	-.0854	.7694	-.1462	-.0710				.7025	-.2028	-.1127			
.8505	-.0968	-.0440	.8967	-.0233	0.0141				.7754	-.1186	-.0504			
.9001	-.0620	-.0260							.8553	-.0739	-.0350			
.9596	0.0120	0.0350							.9037	-.0326	-.0100			
									.9526	0.0320	0.0412			

η=0.541   η=0.587   η=0.694

η=0.332

η=0.851

.40-S-15

Upper Surface
Lower Surface

(m) Test case 9E13 (point .40-S-15)
Figure 5. Continued.

30

.90-S-19

MACH	q	To	H	ALPHAo	THETA	DELTA	RN
	psf	deg R	psf	deg	deg	deg	
0.900	192.7	566.2	656.8	2.99	0.00	0.00	9.80 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.1157	0.1423	.0687	-.1645	0.1505	.0818	-.2628	0.1698	.0675	-.5186	0.1336	.2070	-.3539	-.0787
.1264	-.1554	0.0821	.1282	-.2208	0.0627	.1318	-.2753	0.0787	.1151	-.2509	0.0946	.2559	-.4939	-.1115
.2020	-.1855	0.0220	.2529	-.2777	-.0439	.2099	-.2953	-.0184	.1980	-.2818	-.0278	.3016	-.4585	-.1278
.2523	-.2151	-.0180	.3041	-.3338	-.1155	.7875	-.1166	-.1504	.2559	-.3603	-.0963	.3537	-.4892	-.1529
.3023	-.2600	-.0646	.3531	-.3540	-.1379	.8522	-.0482	-.0777	.3041	-.3595	-.1104	.4583	-.5373	-.2710
.3519	-.2473	-.0771	.4530	-.4013	-.1947	.9017	0.0294	0.0102	.3545	-.4215	-.1536	.5562	-.5970	-.3253
.4510	-.3274	-.1689	.5036	-.4163	-.2287	.9514	0.1018	0.0841	.4537	-.4990	-.2439	.6074	-.4813	-.3099
.5523	-.3194	-.1779	.5534	-.4285	-.2400				.5025	-.4770	-.2550	.6577	-.2045	-.2969
.6025	-.3763	-.2312	.6040	-.4527	-.2715				.5527	-.4818	-.2593	.7071	-.1470	-.2374
.6515	-.4609	-.3048	.6528	-.4805	-.2780				.6038	-.5096	-.2809	.7975	-.0713	-.1076
.6991	-.4401	-.2752	.7030	-.4824	-.2648				.6538	-.5493	-.2950			
.7813	-.2453	-.2350	.7694	-.1611	-.1764				.7025	-.4004	-.3011			
.8505	-.0906	-.1110	.8967	0.0303	0.0067				.7754	-.0780	-.1086			
.9001	-.0212	-.0450							.8553	-.0309	-.0730			
.9596	0.0861	0.0732							.9037	0.0269	-.0031			
									.9526	0.1046	0.0831			
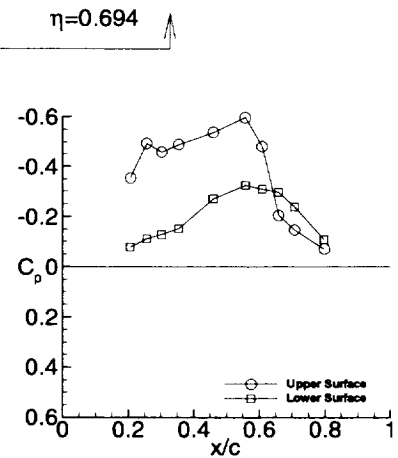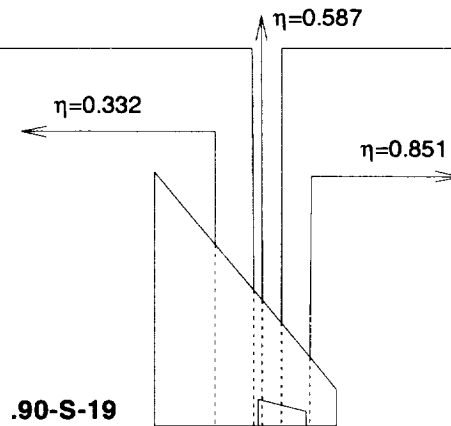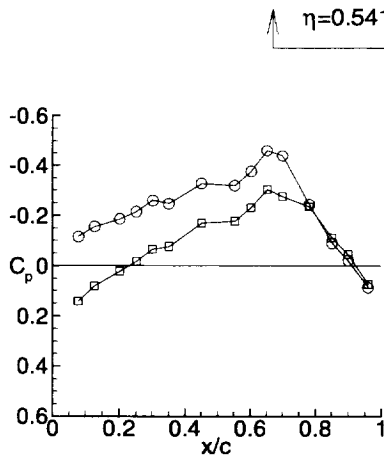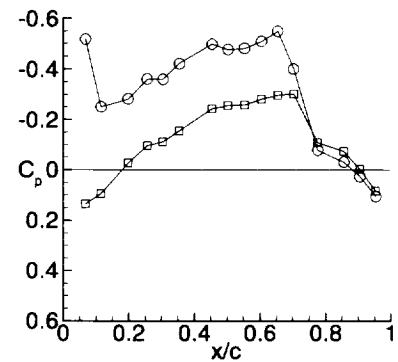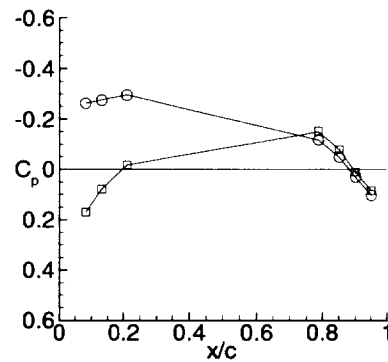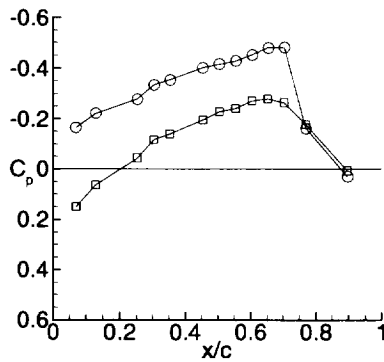
(n) Test case 9E14 (point .90-S-19)
Figure 5.   Continued.

.90-S-38

	MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
	0.901	193.1	556.7	657.2	4.24	0.00	0.00	10.08 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.2488	0.1874	.0687	-.7164	0.2032	.0818	-.5010	0.2256	.0675	-.8835	0.1957	.2070	-.7944	-.0191
.1264	-.1859	0.1249	.1282	-.4673	0.1180	.1318	-.4816	0.1360	.1151	-.7772	0.1535	.2559	-.6952	-.0549
.2020	-.2332	0.0600	.2529	-.3117	0.0005	.2099	-.4176	0.0307	.1980	-.4440	0.0236	.3016	-.6302	-.0763
.2523	-.2628	0.0196	.3041	-.3755	-.0715	.7875	-.1415	-.1461	.2559	-.4078	-.0452	.3537	-.5967	-.1015
.3023	-.3109	-.0271	.3531	-.3983	-.0941	.8522	-.0469	-.0788	.3041	-.3984	-.0602	.4583	-.6162	-.2219
.3519	-.2946	-.0427	.4530	-.4457	-.1532	.9017	0.0297	0.0072	.3545	-.4528	-.1057	.5562	-.5202	-.2784
.4510	-.3584	-.1351	.5036	-.4658	-.1904	.9514	0.0898	0.0833	.4537	-.5477	-.1936	.6074	-.3307	-.2712
.5523	-.3585	-.1487	.5534	-.4770	-.2013				.5025	-.5368	-.2058	.6577	-.2292	-.2771
.6025	-.4130	-.1979	.6040	-.5036	-.2356				.5527	-.5385	-.2174	.7071	-.1834	-.2428
.6515	-.5011	-.2625	.6528	-.5279	-.2427				.6038	-.5585	-.2338	.7975	-.1012	-.1259
.6991	-.4896	-.2421	.7030	-.5100	-.2365				.6538	-.5786	-.2590			
.7813	-.2364	-.2088	.7694	-.1617	-.1671				.7025	-.3105	-.2689			
.8505	-.0880	-.1107	.8967	0.0273	0.0063				.7754	-.0813	-.1108			
.9001	-.0214	-.0524							.8553	-.0334	-.0764			
.9596	0.0831	0.0663							.9037	0.0249	-.0085			
									.9526	0.0999	0.0784			

(o) Test case 9E15 (point .90-S-38)
Figure 5. Continued.

32

.40-S-3

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.406	85.3	548.0	1004.7	0.05	0.00	4.00	9.50 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.0126	-.0045	.0687	-.0200	-.0114	.0818	-.0025	0.0099	.0675	-.0475	-.0277	.2070	-.1753	-.1409
.1264	-.0527	-.0461	.1282	-.0704	-.0592	.1318	-.0600	-.0464	.1151	-.0434	-.0257	.2559	-.1839	-.1466
.2020	-.0874	-.0809	.2529	-.1226	-.1097	.2099	-.1104	-.0958	.1980	-.1303	-.1106	.3016	-.1906	-.1507
.2523	-.1078	-.0999	.3041	-.1656	-.1501	.7875	-.1811	-.0394	.2559	-.1632	-.1414	.3537	-.1895	-.1479
.3023	-.1314	-.1236	.3531	-.1653	-.1489	.8522	-.1104	0.0009	.3041	-.1581	-.1335	.4583	-.2399	-.1904
.3519	-.1338	-.1251	.4530	-.1827	-.1615	.9017	-.0384	0.0132	.3545	-.1810	-.1529	.5562	-.2229	-.1656
.4510	-.1760	-.1658	.5036	-.1895	-.1659	.9514	0.0280	0.0364	.4537	-.2216	-.1843	.6074	-.2059	-.1424
.5523	-.1566	-.1444	.5534	-.1830	-.1559				.5025	-.2113	-.1680	.6577	-.2090	-.1381
.6025	-.1722	-.1583	.6040	-.1919	-.1598				.5527	-.2087	-.1557	.7071	-.1919	-.1159
.6515	-.1917	-.1762	.6528	-.1790	-.1410				.6038	-.2094	-.1438	.7975	-.1334	-.0538
.6991	-.1718	-.1555	.7030	-.1659	-.1206				.6538	-.2161	-.1307			
.7813	-.1286	-.1116	.7694	-.1377	-.0759				.7025	-.2237	-.1083			
.8505	-.0754	-.0614	.8967	-.0276	0.0108				.7754	-.1841	0.0185			
.9001	-.0454	-.0338							.8553	-.1421	0.0257			
.9596	0.0269	0.0345							.9037	-.0592	0.0200			
									.9526	0.0277	0.0550			

η=0.541   η=0.587   η=0.694

η=0.332   η=0.851

.40-S-3

Upper Surface
Lower Surface
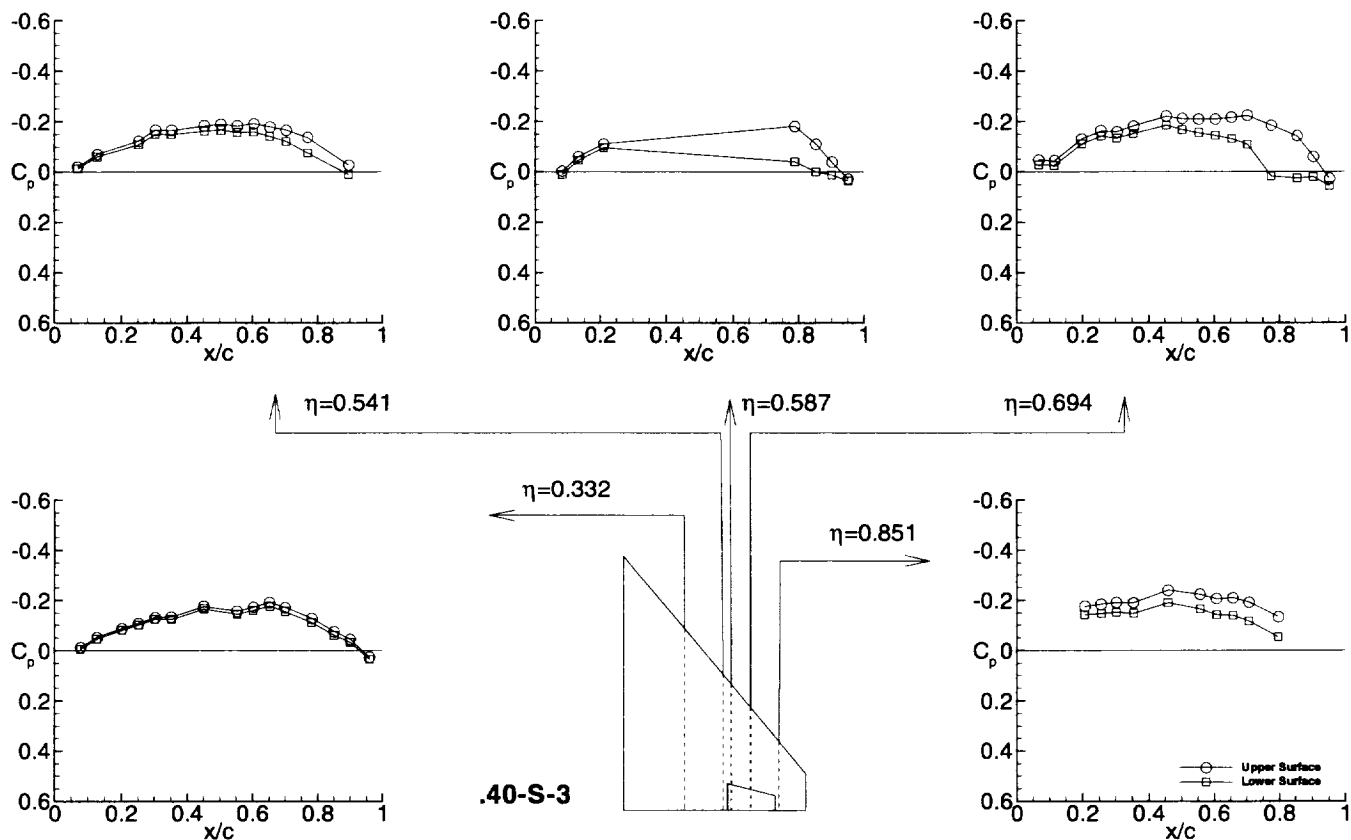
(p) Test case 9E16 (point .40-S-3)
Figure 5. Continued.

33

.90-S-2

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.898	190.8	562.9	651.9	0.05	0.00	2.00	9.83 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0205	0.0190	.0687	0.0050	0.0023	.0818	0.0196	0.0173	.0675	-.0533	-.0547	.2070	-.2722	-.2700
.1264	-.0332	-.0337	.1282	-.0756	-.0792	.1318	-.0582	-.0609	.1151	-.0577	-.0582	.2559	-.3223	-.3174
.2020	-.0803	-.0798	.2529	-.1556	-.1551	.2099	-.1464	-.1480	.1980	-.1759	-.1758	.3016	-.2916	-.2862
.2523	-.1133	-.1126	.3041	-.2259	-.2257	.7875	-.2181	-.1122	.2559	-.2409	-.2403	.3537	-.3116	-.3047
.3023	-.1578	-.1570	.3531	-.2473	-.2469	.8522	-.1242	-.0443	.3041	-.2497	-.2483	.4583	-.4152	-.3996
.3519	-.1625	-.1622	.4530	-.2891	-.2879	.9017	-.0001	0.0165	.3545	-.2912	-.2890	.5562	-.4573	-.4091
.4510	-.2488	-.2473	.5036	-.3260	-.3228	.9514	0.0984	0.0781	.4537	-.3805	-.3728	.6074	-.4208	-.3481
.5523	-.2436	-.2425	.5534	-.3242	-.3185				.5025	-.3662	-.3582	.6577	-.3918	-.2780
.6025	-.3003	-.2989	.6040	-.3555	-.3476				.5527	-.3793	-.3654	.7071	-.3137	-.1961
.6515	-.3712	-.3638	.6528	-.3656	-.3486				.6038	-.4018	-.3775	.7975	-.1220	-.0721
.6991	-.3334	-.3248	.7030	-.3501	-.3167				.6538	-.4116	-.3558			
.7813	-.2615	-.2356	.7694	-.2340	-.1565				.7025	-.4064	-.2915			
.8505	-.1296	-.1065	.8967	-.0035	0.0180				.7754	-.2179	-.0513			
.9001	-.0497	-.0348							.8553	-.1142	-.0161			
.9596	0.0680	0.0777							.9037	0.0033	0.0206			
									.9526	0.1072	0.0915			
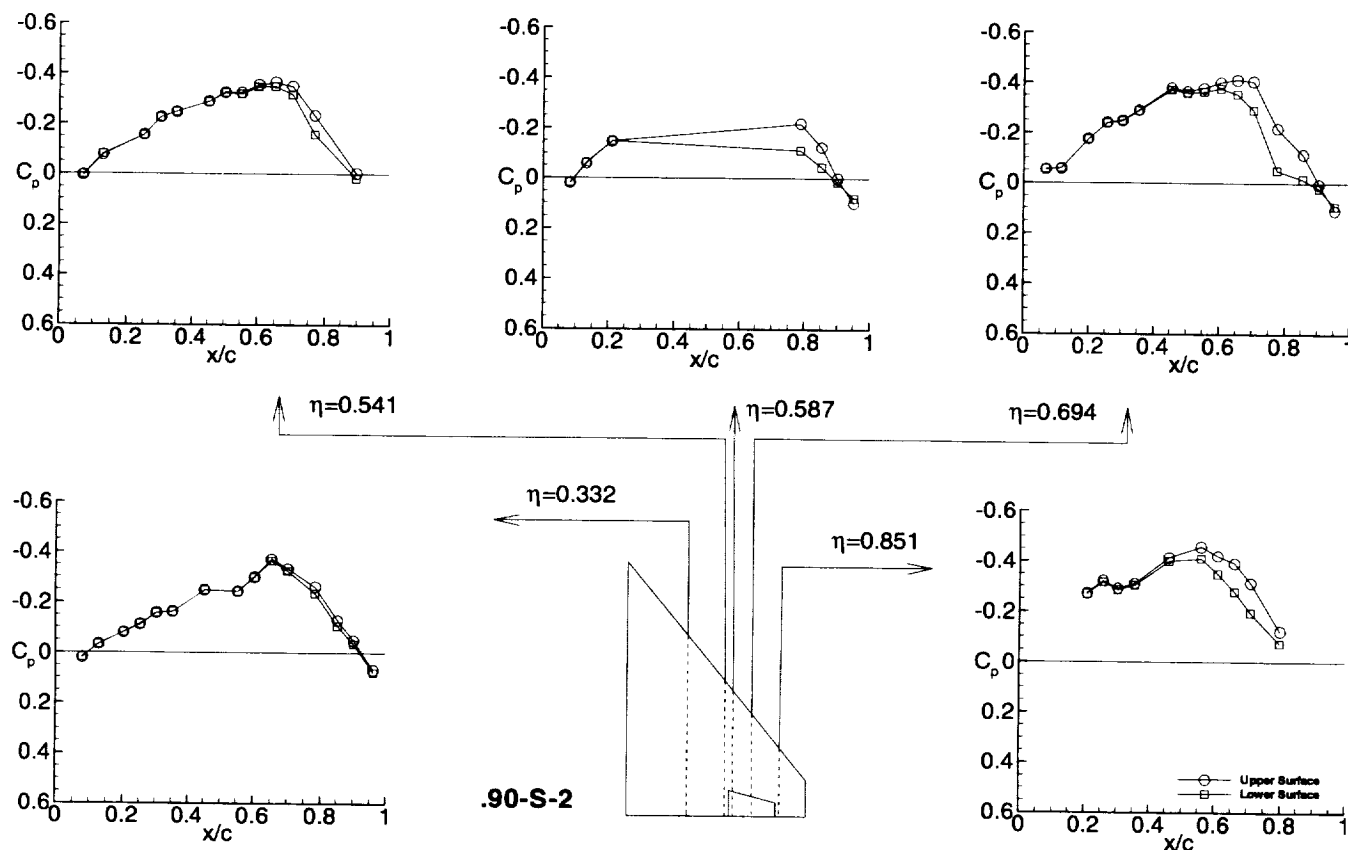
(q) Test case 9E17 (point .90-S-2)
Figure 5. Continued.

.90-S-3

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.896	190.4	563.0	652.0	0.05	0.00	4.00	9.82 *10**6

| y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0181	0.0188	.0687	0.0003	-.0046	.0818	0.0163	0.0232	.0675	-.0536	-.0542	.2070	-.2721	-.2699
.1264	-.0328	-.0323	.1282	-.0785	-.0795	.1318	-.0604	-.0603	.1151	-.0582	-.0572	.2559	-.3195	-.3215
.2020	-.0803	-.0794	.2529	-.1551	-.1560	.2099	-.1474	-.1489	.1980	-.1755	-.1751	.3016	-.2902	-.2894
.2523	-.1131	-.1118	.3041	-.2256	-.2263	.7875	-.2856	-.0557	.2559	-.2391	-.2411	.3537	-.3124	-.3027
.3023	-.1574	-.1567	.3531	-.2455	-.2512	.8522	-.1536	0.0096	.3041	-.2485	-.2484	.4583	-.4186	-.3960
.3519	-.1630	-.1620	.4530	-.2885	-.2862	.9017	-.0170	0.0369	.3545	-.2897	-.2901	.5562	-.4691	-.3958
.4510	-.2483	-.2471	.5036	-.3246	-.3243	.9514	0.0977	0.0783	.4537	-.3766	-.3762	.6074	-.4406	-.3116
.5523	-.2435	-.2416	.5534	-.3226	-.3218				.5025	-.3661	-.3569	.6577	-.4354	-.2178
.6025	-.2996	-.2968	.6040	-.3569	-.3480				.5527	-.3786	-.3629	.7071	-.3767	-.1603
.6515	-.3682	-.3604	.6528	-.3684	-.3487				.6038	-.4043	-.3680	.7975	-.1620	-.0444
.6991	-.3353	-.3189	.7030	-.3595	-.3040				.6538	-.4204	-.3308			
.7813	-.2704	-.2203	.7694	-.2764	-.1234				.7025	-.4298	-.2268			
.8505	-.1297	-.0933	.8967	-.0272	0.0317				.7754	-.3100	0.0159			
.9001	-.0568	-.0306							.8553	-.1531	0.0401			
.9596	0.0729	0.0788							.9037	0.0014	0.0375			
									.9526	0.1096	0.0832			
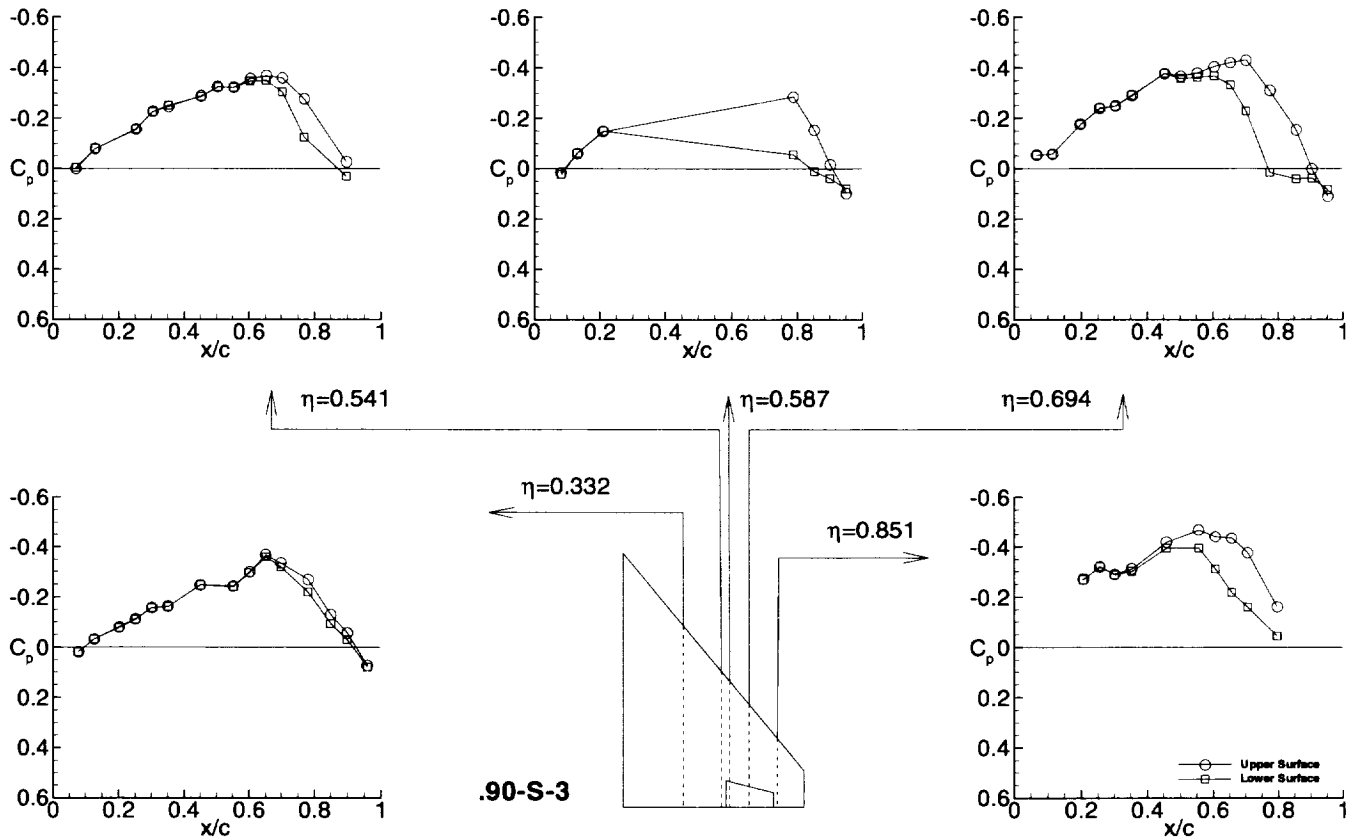
(r) Test case 9E18 (point .90-S-3)
Figure 5. Continued.

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.944	203.7	562.1	658.9	0.05	0.00	4.00	10.09 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0310	0.0331	.0687	0.0157	0.0140	.0818	0.0302	0.0323	.0675	-.0605	-.0621	.2070	-.2332	-.2336
.1264	-.0197	-.0172	.1282	-.0733	-.0730	.1318	-.0518	-.0509	.1151	-.0424	-.0422	.2559	-.3287	-.3269
.2020	-.0647	-.0627	.2529	-.1378	-.1366	.2099	-.1413	-.1401	.1980	-.1421	-.1393	.3016	-.3074	-.3066
.2523	-.0973	-.0953	.3041	-.2043	-.2038	.7875	-.5485	-.4476	.2559	-.2252	-.2236	.3537	-.3444	-.3427
.3023	-.1433	-.1422	.3531	-.2379	-.2389	.8522	-.2072	-.1302	.3041	-.2327	-.2307	.4583	-.4209	-.4221
.3519	-.1404	-.1382	.4530	-.3042	-.3023	.9017	-.0433	0.0228	.3545	-.2987	-.2972	.5562	-.4709	-.4730
.4510	-.2362	-.2345	.5036	-.3202	-.3183	.9514	0.0496	0.0751	.4537	-.3827	-.3808	.6074	-.4687	-.4655
.5523	-.2463	-.2438	.5534	-.3378	-.3366				.5025	-.3784	-.3771	.6577	-.5225	-.5189
.6025	-.3075	-.3068	.6040	-.3612	-.3599				.5527	-.3788	-.3801	.7071	-.5978	-.5935
.6515	-.3960	-.3928	.6528	-.3967	-.3945				.6038	-.4126	-.4106	.7975	-.4471	-.3809
.6991	-.3989	-.3958	.7030	-.4425	-.4404				.6538	-.4688	-.4655			
.7813	-.4072	-.4058	.7694	-.4596	-.4585				.7025	-.5225	-.5189			
.8505	-.3228	-.3025	.8967	-.0239	0.0084				.7754	-.5225	-.4462			
.9001	-.0295	-.0132							.8553	-.1409	-.0573			
.9596	0.1056	0.1086							.9037	-.0250	0.0131			
									.9526	0.0422	0.0448			
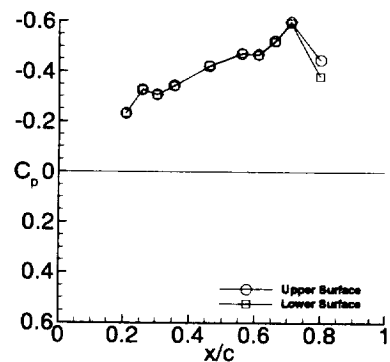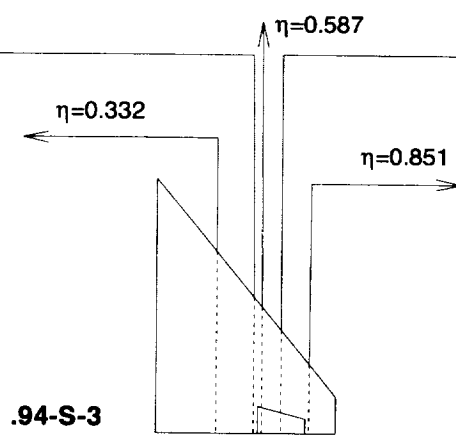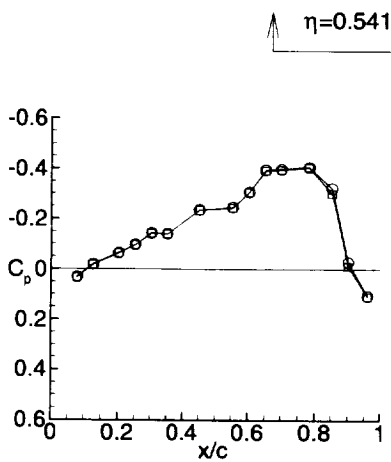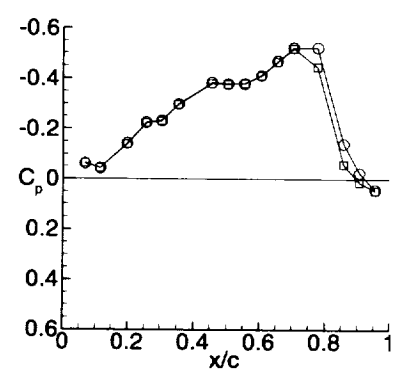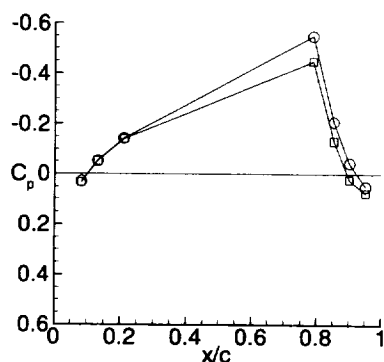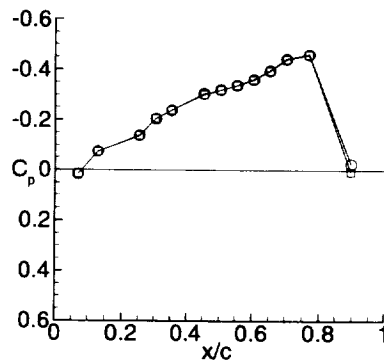
(s)   Test case 9E19 (point .94-S-3)
Figure 5.   Continued.

1.12-S-3

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
1.120	231.1	575.9	642.5	0.00	0.00	4.00	9.61 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	0.0354	0.0345	.0687	0.0725	0.0650	.0818	0.1785	0.1755	.0675	0.1158	0.1098	.2070	-.0403	-.0352
.1264	-.0008	-.0021	.1282	0.0824	0.0791	.1318	0.0692	0.0667	.1151	0.1281	0.1178	.2559	-.1126	-.1129
.2020	-.0871	-.0832	.2529	0.0246	0.0053	.2099	0.0286	0.0111	.1980	0.0280	0.0108	.3016	-.1083	-.1085
.2523	-.0452	-.0442	.3041	-.0190	-.0405	.7875	-.3811	-.3729	.2559	-.0456	-.0622	.3537	-.1484	-.1463
.3023	-.0008	-.0113	.3531	-.0799	-.0827	.8522	-.3770	-.2247	.3041	-.0536	-.0542	.4583	-.2091	-.2074
.3519	0.0059	-.0330	.4530	-.1520	-.1488	.9017	-.3737	-.2585	.3545	-.1125	-.1111	.5562	-.2679	-.2654
.4510	-.0994	-.0940	.5036	-.1846	-.1772	.9514	-.4071	-.3057	.4537	-.2015	-.1978	.6074	-.2680	-.2631
.5523	-.1042	-.0979	.5534	-.1931	-.1876				.5025	-.2045	-.1999	.6577	-.2912	-.2864
.6025	-.1382	-.1317	.6040	-.1808	-.1786				.5527	-.2184	-.2152	.7071	-.3390	-.3340
.6515	-.2160	-.2145	.6528	-.2011	-.1995				.6038	-.2160	-.2114	.7975	-.3773	-.3708
.6991	-.2361	-.2347	.7030	-.2566	-.2555				.6538	-.2388	-.2307			
.7813	-.2451	-.2444	.7694	-.2923	-.2914				.7025	-.2696	-.2673			
.8505	-.2791	-.2783	.8967	-.3103	-.2550				.7754	-.2767	-.2741			
.9001	-.3205	-.3185							.8553	-.4229	-.1814			
.9596	-.3403	-.3393							.9037	-.4653	-.2208			
									.9526	-.4690	-.2541			

1.12-S-3

(t) Test case 9E20 (point 1.12-S-3)
Figure 5. Continued.

.90-S-21

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.901	193.1	566.3	657.4	2.99	0.00	4.00	9.81 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.1171	0.1397	.0687	-.1593	0.1493	.0818	-.2644	0.1730	.0675	-.5380	0.1363	.2070	-.3578	-.0725
.1264	-.1573	0.0788	.1282	-.2216	0.0619	.1318	-.2754	0.0787	.1151	-.2590	0.0974	.2559	-.4908	-.1053
.2020	-.1864	0.0178	.2529	-.2793	-.0431	.2099	-.2964	-.0202	.1980	-.2800	-.0265	.3016	-.4524	-.1205
.2523	-.2168	-.0211	.3041	-.3350	-.1150	.7875	-.2260	-.0507	.2559	-.3623	-.0915	.3537	-.4853	-.1413
.3023	-.2598	-.0680	.3531	-.3542	-.1372	.8522	-.1168	0.0133	.3041	-.3594	-.1060	.4583	-.5359	-.2532
.3519	-.2474	-.0803	.4530	-.3992	-.1914	.9017	0.0038	0.0362	.3545	-.4193	-.1468	.5562	-.6014	-.2760
.4510	-.3311	-.1699	.5036	-.4141	-.2274	.9514	0.0972	0.0708	.4537	-.4965	-.2312	.6074	-.5687	-.2363
.5523	-.3216	-.1779	.5534	-.4298	-.2333				.5025	-.4767	-.2389	.6577	-.4035	-.2072
.6025	-.3744	-.2249	.6040	-.4518	-.2645				.5527	-.4838	-.2390	.7071	-.2165	-.1606
.6515	-.4600	-.2909	.6528	-.4829	-.2624				.6038	-.5111	-.2406	.7975	-.1324	-.0600
.6991	-.4314	-.2599	.7030	-.4985	-.2301				.6538	-.5546	-.2314			
.7813	-.2725	-.1975	.7694	-.2516	-.1164				.7025	-.5594	-.1815			
.8505	-.1107	-.0937	.8967	0.0010	0.0308				.7754	-.2049	0.0237			
.9001	-.0345	-.0385							.8553	-.1122	0.0419			
.9596	0.0794	0.0710							.9037	0.0064	0.0358			
									.9526	0.1029	0.0815			

(u) Test case 9E21 (point .90-S-21)
Figure 5. Continued.

.90-S-24

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.896	192.1	566.6	657.8	2.99	0.00	-4.00	9.80 *10**6

y/s= 0.332			y/s= 0.541			y/s= 0.587			y/s= 0.694			y/s= 0.851		
x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl	x/c	Cpu	Cpl
.0778	-.1178	0.1408	.0687	-.1747	0.1528	.0818	-.2667	0.1711	.0675	-.5681	0.1361	.2070	-.3582	-.0818
.1264	-.1574	0.0793	.1282	-.2225	0.0627	.1318	-.2764	0.0773	.1151	-.2725	0.0957	.2559	-.4864	-.1185
.2020	-.1858	0.0171	.2529	-.2812	-.0437	.2099	-.2970	-.0219	.1980	-.2794	-.0291	.3016	-.4458	-.1354
.2523	-.2160	-.0221	.3041	-.3370	-.1183	.7875	-.0486	-.2910	.2559	-.3638	-.0962	.3537	-.4751	-.1617
.3023	-.2610	-.0694	.3531	-.3541	-.1406	.8522	0.0069	-.1736	.3041	-.3603	-.1120	.4583	-.5111	-.2874
.3519	-.2496	-.0822	.4530	-.3994	-.1988	.9017	0.0378	-.0215	.3545	-.4182	-.1558	.5562	-.3001	-.3495
.4510	-.3324	-.1735	.5036	-.4109	-.2391	.9514	0.0837	0.0880	.4537	-.4911	-.2486	.6074	-.1939	-.3558
.5523	-.3220	-.1840	.5534	-.4240	-.2491				.5025	-.4695	-.2621	.6577	-.1730	-.3962
.6025	-.3733	-.2357	.6040	-.4385	-.2854				.5527	-.4683	-.2692	.7071	-.1379	-.4217
.6515	-.4501	-.3110	.6528	-.4073	-.3078				.6038	-.4510	-.2954	.7975	-.0362	-.1765
.6991	-.3736	-.2940	.7030	-.2696	-.3024				.6538	-.2908	-.3231			
.7813	-.1997	-.2627	.7694	-.1137	-.2661				.7025	-.1666	-.3634			
.8505	-.0812	-.1387	.8967	0.0421	-.0274				.7754	0.0235	-.3046			
.9001	-.0187	-.0651							.8553	0.0438	-.1754			
.9596	0.0835	0.0630							.9037	0.0440	-.0042			
									.9526	0.0904	0.1034			
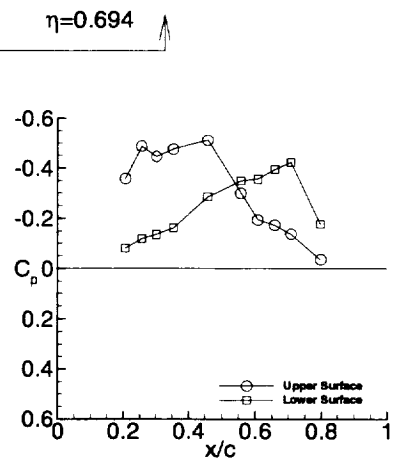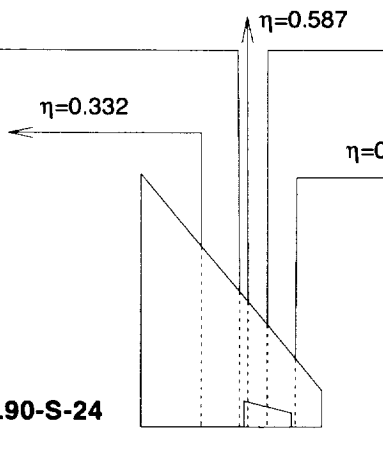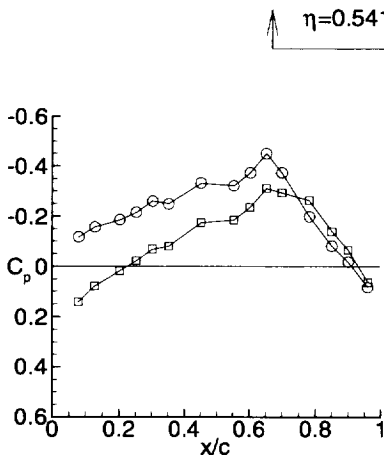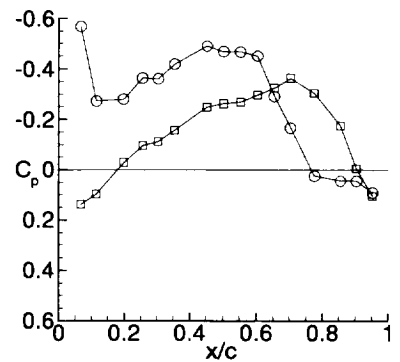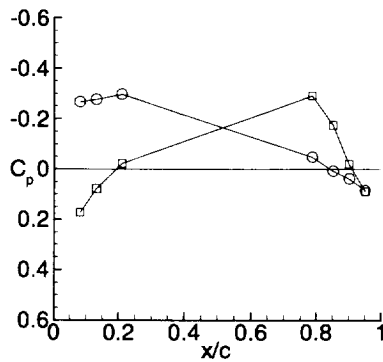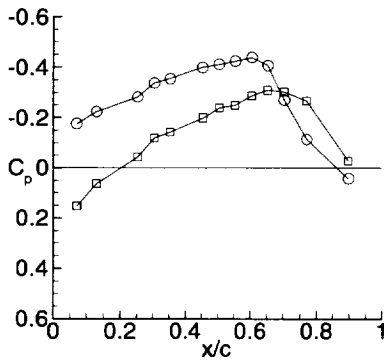
(v) Test case 9E22 (point .90-S-24)
Figure 5. Concluded.

39

.40-D-5

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.403	76.9	518.7	915.1	0.05	0.47	0.00	9.28*10**6

f = 4.00 Hz   k = 0.194

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-1.0164	0.1248		
.1120	-2.3645	-0.0454		
.1974	-2.0841	-0.2301		
.2478	-1.8585	-0.3411		
.2987	-1.6538	-0.4215		
.3486	-1.8719	-0.6666		
.4477	-1.1773	-0.6419		
.5506	-0.9253	-0.6551		
.6009	-0.8752	-0.7396		
.6459	-0.7016	-0.7291		
.6979	-0.4547	-0.6190		
.7805	-0.3002	-0.5995		
.8500	-0.1637	-0.4980		
.8996	-0.0484	-0.3871		
.9495	0.0681	-0.2341		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	0.7368	-1.7400		
.1217	-3.1206	-0.0381		
.2485	-2.1679	-0.3395		
.3004	-1.5804	-0.3620		
.3481	-1.7612	-0.4917		
.4487	-1.7069	-0.6212		
.4997	-1.0616	-0.5479		
.5500	-1.0158	-0.5561		
.6014	-0.8945	-0.5699		
.6494	-0.7760	-0.6106		
.6995	-0.6348	-0.5518		
.7747	-0.4095	-0.4678		
.8964	-0.2959	-0.4028		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-2.2447	3.4698		
.1271	-3.2061	-0.0056		
.1993	-2.5750	-0.2208		
.7802	-0.3102	-0.3763		
.8514	-0.2386	-0.3537		
.9016	-0.1398	-0.3247		
.9511	0.0755	-0.1109		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-3.0719	0.0322		
.1237	-3.3272	-0.0755		
.1980	-2.7480	-0.1970		
.2502	-2.5198	-0.2826		
.3001	-2.2420	-0.3391		
.3476	-2.1343	-0.3917		
.4495	-1.6580	-0.4536		
.4974	-1.4782	-0.4604		
.5484	-1.0369	-0.4274		
.6007	-1.0173	-0.4722		
.6514	-0.8273	-0.4436		
.7000	-0.6806	-0.4057		
.7795	-0.3890	-0.3139		
.8547	-0.3099	-0.2752		
.9033	-0.1660	-0.2260		
.9522	0.6946	-0.0177		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-3.1211	-0.2731		
.2458	-2.8152	-0.2711		
.2915	-2.6187	-0.2752		
.3454	-2.2937	-0.3224		
.4519	-1.5923	-0.3647		
.5497	-1.0690	-0.3391		
.6025	-0.8918	-0.3299		
.6545	-0.7304	-0.3375		
.7049	-0.5528	-0.3102		
.7808	-0.0550	-0.0262		

(a-1) Tabulated data for test case 9E23 (point .40-D-5)
Figure 6.   Dynamic test cases.
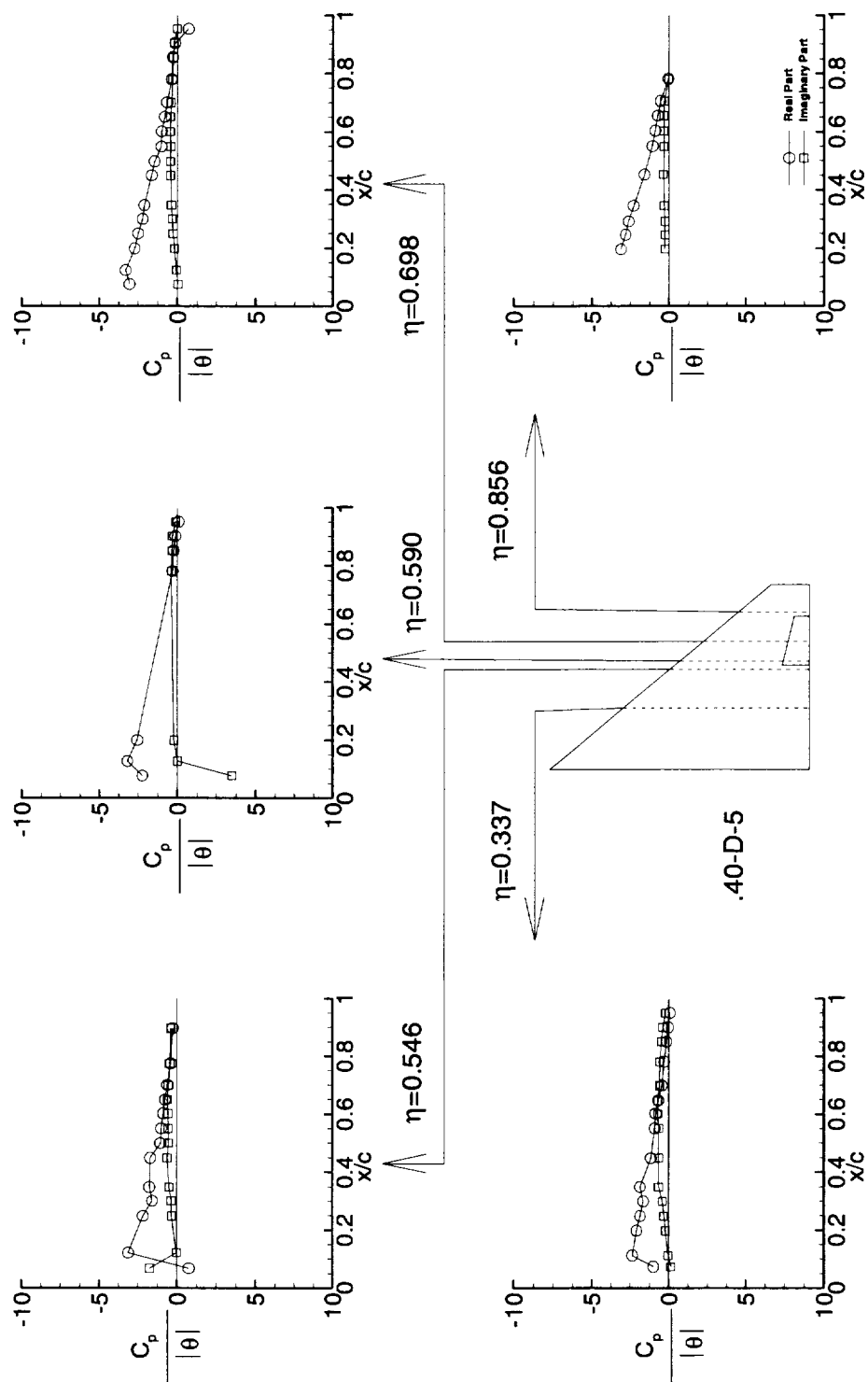
(a-2) Plot of data for test case 9E23 (point .40-D-5)
Figure 6. Continued.

41

.88-D-5

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.885	185.5	556.6	644.0	0.05	0.48	0.00	9.83*10**6

f = 7.98 Hz   k = 0.173

y/s = 0.337

	Upper		Lower				Upper		Lower	
x/c	Real	Imag	Real	Imag		x/c	Real	Imag	Real	Imag
.0731	-2.5014	0.7173				.0681	-3.5404	0.7396		
.1120	-0.1255	-0.1439				.1217	0.0156	0.1183		
.1974	-2.2288	0.2618				.2485	-2.7309	0.1192		
.2478	-2.2410	0.1174				.3004	-2.5306	0.0000		
.2987	-2.2775	-0.1034				.3481	-2.6798	-0.1780		
.3486	-2.4758	-0.1862				.4487	-3.0073	-0.3852		
.4477	-1.8719	-0.3132				.4997	-2.2419	-0.6259		
.5506	-1.6537	-0.5501				.5500	-2.0357	-0.8557		
.6009	-1.9491	-0.8153				.6014	-2.0045	-1.1111		
.6459	-2.0964	-1.1668				.6494	-1.9549	-1.7174		
.6979	-1.3098	-1.3236				.6995	-0.6239	-1.3947		
.7805	-0.1313	-1.4024				.7747	0.1526	-0.7851		
.8500	0.2156	-0.6453				.8964	0.1249	-0.3483		
.8996	0.4375	-0.4403								
.9495	0.4350	-0.2492								

y/s = 0.590

	Upper		Lower				Upper		Lower	
x/c	Real	Imag	Real	Imag		x/c	Real	Imag	Real	Imag
.0767	-4.2829	1.0282				.0754	0.0460	-0.0129		
.1271	0.0972	-0.0692				.1237	0.1108	-0.2899		
.1993	-2.8626	0.3870				.1980	-3.9302	0.5944		
.7802	-0.1086	-0.3034				.2502	-3.5802	0.4206		
.8514	-0.0835	-0.2615				.3001	-3.6274	0.3110		
.9016	0.1548	-0.1490				.3476	-4.0346	0.0141		
.9511	0.3338	0.0164				.4495	-3.7190	-0.3581		
						.4974	-2.5456	-0.7783		
						.5484	-3.0266	-1.1076		
						.6007	-2.5616	-1.2827		
						.6514	-1.6165	-1.3231		
						.7000	-0.6185	-1.3447		
						.7795	-0.2490	-0.2737		
						.8547	0.0773	-0.4712		
						.9033	0.1803	-0.4806		
						.9522	0.2888	-0.3341		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-4.2931	0.1874		
.2458	-4.7860	0.0752		
.2915	-4.1658	-0.0291		
.3454	-3.7387	-0.3996		
.4519	-2.5100	-0.6866		
.5497	-1.2921	-1.1153		
.6025	0.0000	0.0000		
.6545	0.0450	-0.4633		
.7049	0.2878	-0.3958		
.7808	0.0000	0.0000		

(b-1) Tabulated data for test case 9E24 (point .88-D-5)
Figure 6. Continued.

42
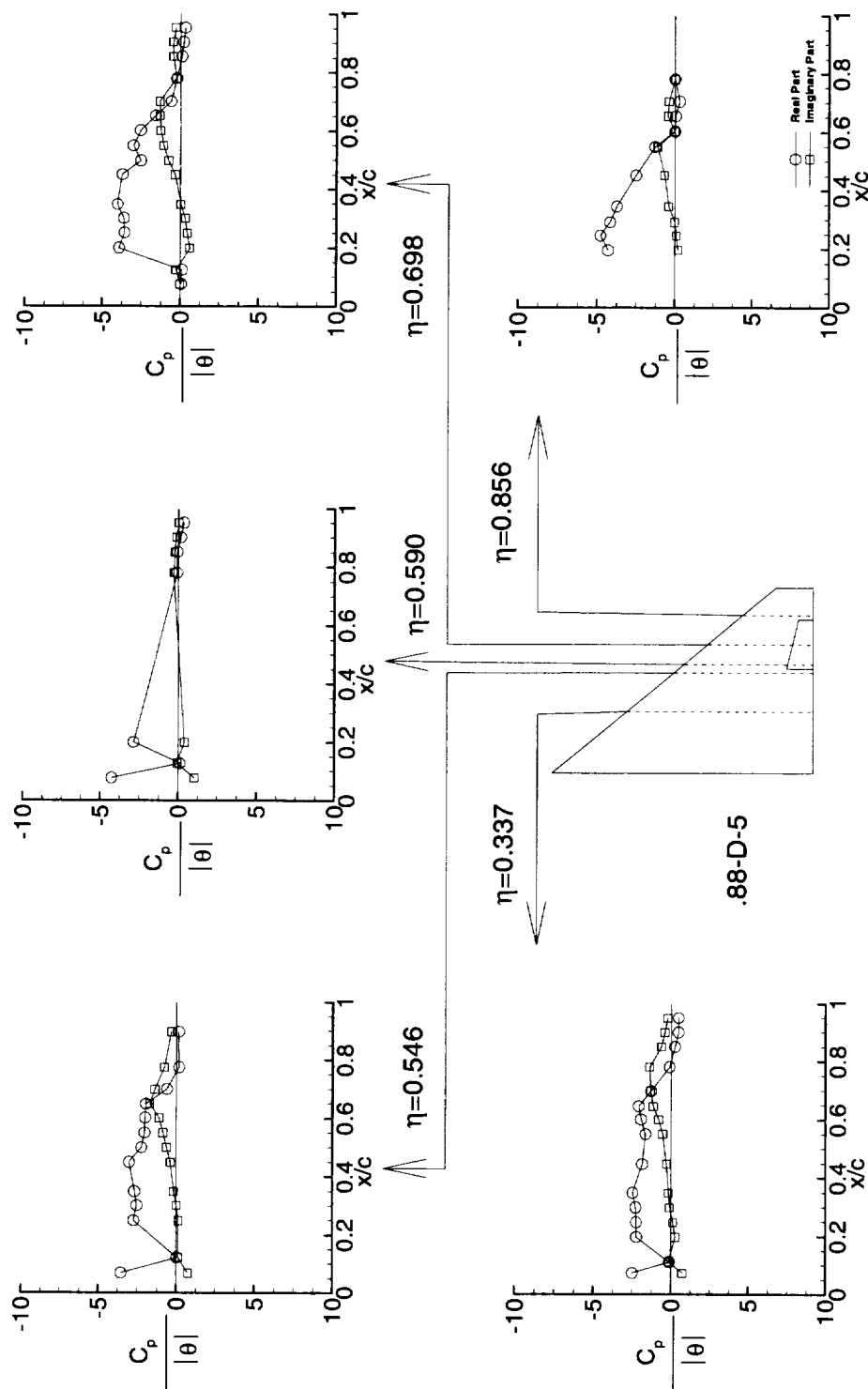
(b-2) Plot of data for test case 9E24 (point.88-D-5)
Figure 6. Continued.

43

.90-D-5

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.904	200.3	566.2	679.5	0.00	0.46	0.00	10.13*10**6

f = 7.99 Hz   k = 0.167

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-2.4667	0.7920		
.1120	-2.1392	0.5334		
.1974	-2.1072	0.3867		
.2478	-2.1140	0.2596		
.2987	-1.0684	0.0766		
.3486	-2.2901	0.0880		
.4477	-1.8757	-0.1377		
.5506	-2.0993	-0.1542		
.6009	-2.1938	-0.4623		
.6459	-2.5171	-0.6136		
.6979	-4.0662	-0.8791		
.7805	0.2918	-3.4253		
.8500	0.8783	-0.8655		
.8996	0.7067	-0.4199		
.9495	0.4162	-0.1668		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-3.8789	1.2007		
.1217	-3.2047	0.8407		
.2485	-2.4548	0.4240		
.3004	-2.0958	0.3020		
.3481	-1.3275	0.2174		
.4487	-2.9393	0.0359		
.4997	-2.1027	-0.0992		
.5500	-2.4586	0.1935		
.6014	-2.6647	0.0651		
.6494	-4.7044	-0.1889		
.6995	-4.5903	-2.0919		
.7747	1.0737	-2.1090		
.8964	0.3784	-0.5410		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-3.6778	1.2163		
.1271	-3.2311	0.9326		
.1993	-2.9437	0.7558		
.7802	1.6063	-1.4734		
.8514	0.3705	-0.2741		
.9016	0.6694	-0.3851		
.9511	0.6307	-0.0754		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-2.2762	0.2674		
.1237	-4.1315	1.0378		
.1980	-3.8566	0.7217		
.2502	0.6121	-3.4714		
.3001	-1.4630	0.1409		
.3476	-3.2697	0.3494		
.4495	-3.1492	0.3032		
.4974	-2.9312	0.3495		
.5484	-2.5658	0.0134		
.6007	-3.1078	-0.1955		
.6514	-4.3593	-1.4164		
.7000	-2.1524	-2.9626		
.7795	0.6742	-0.4254		
.8547	0.5982	-0.1213		
.9033	0.5532	-0.1917		
.9522	0.6080	-0.0529		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-3.1322	0.5975		
.2458	-4.2549	0.8271		
.2915	-4.8539	1.0672		
.3454	-1.7394	3.0372		
.4519	-3.6992	0.0323		
.5497	-4.8832	-0.6950		
.6025	-4.2134	-2.8634		
.6545	1.1374	-4.1181		
.7049	3.4864	-0.9446		
.7808	1.0075	0.0537		

(c-1) Tabulated data for test case 9E26 (point.90-D-5)
Figure 6. Continued.

44

(c-2) Plot of data for test case 9E25 (point.90-D-5)
Figure 6. Continued.

.92-D-5

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.921	198.5	556.1	659.2	0.05	0.47	0.00	10.21*10**6

f = 7.97 Hz   k = 0.166

y/s = 0.337

	Upper		Lower			Upper		Lower	
x/c	Real	Imag	Real	Imag	x/c	Real	Imag	Real	Imag
.0731	-2.3255	0.8098			.0681	-3.2648	0.7059		
.1120	-0.0780	-0.1238			.1217	0.1293	0.1461		
.1974	-2.2100	0.4496			.2485	-2.3795	0.2166		
.2478	-2.1192	0.2452			.3004	-1.7552	-0.0306		
.2987	-1.8615	0.1171			.3481	-1.9941	-0.1429		
.3486	-1.8128	0.1141			.4487	-3.1511	0.1983		
.4477	-1.7634	0.2416			.4997	0.0000	0.0000		
.5506	-1.5593	-0.0572			.5500	-1.6921	-0.2228		
.6009	-1.6203	0.0594			.6014	-1.5734	-0.4393		
.6459	-1.7940	0.2841			.6494	-1.7845	-0.4516		
.6979	-1.5871	-0.2656			.6995	-2.2703	-0.2066		
.7805	-3.5438	-0.1609			.7747	-4.1636	-1.0381		
.8500	-0.0296	-2.0966			.8964	0.3559	-0.4333		
.8996	0.9850	-0.9278							
.9495	0.7045	-0.4368							

y/s = 0.590

	Upper		Lower			Upper		Lower	
x/c	Real	Imag	Real	Imag	x/c	Real	Imag	Real	Imag
.0767	-3.2424	0.5659			.0754	0.0315	-0.0186		
.1271	0.0258	-0.1066			.1237	-0.2332	-0.1325		
.1993	-2.6226	0.4295			.1980	-2.8269	0.3822		
.7802	-7.3969	0.7644			.2502	-2.0793	0.1490		
.8514	-0.1635	-0.8996			.3001	-2.2732	0.1709		
.9016	0.6101	-0.7451			.3476	-3.2166	0.4980		
.9511	0.8416	-0.2893			.4495	-2.0824	-0.0946		
					.4974	-2.6302	0.1240		
					.5484	-1.7392	-0.2382		
					.6007	-1.7343	-0.1762		
					.6514	-1.8647	-0.0423		
					.7000	-2.0960	0.0585		
					.7795	-3.9876	2.2104		
					.8547	0.1187	-0.3844		
					.9033	0.3906	-0.3676		
					.9522	0.0000	0.0000		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-1.9589	0.2509		
.2458	-3.2871	0.5206		
.2915	-3.9284	0.6011		
.3454	-3.3481	0.1696		
.4519	-3.1038	0.5083		
.5497	-2.6725	0.2244		
.6025	-1.9772	-0.1974		
.6545	-1.5155	-0.4633		
.7049	-1.8074	-1.2008		
.7808	0.0000	0.0000		

(d-1) Tabulated data for test case 9E26 (point.92-D-5)
Figure 6. Continued.
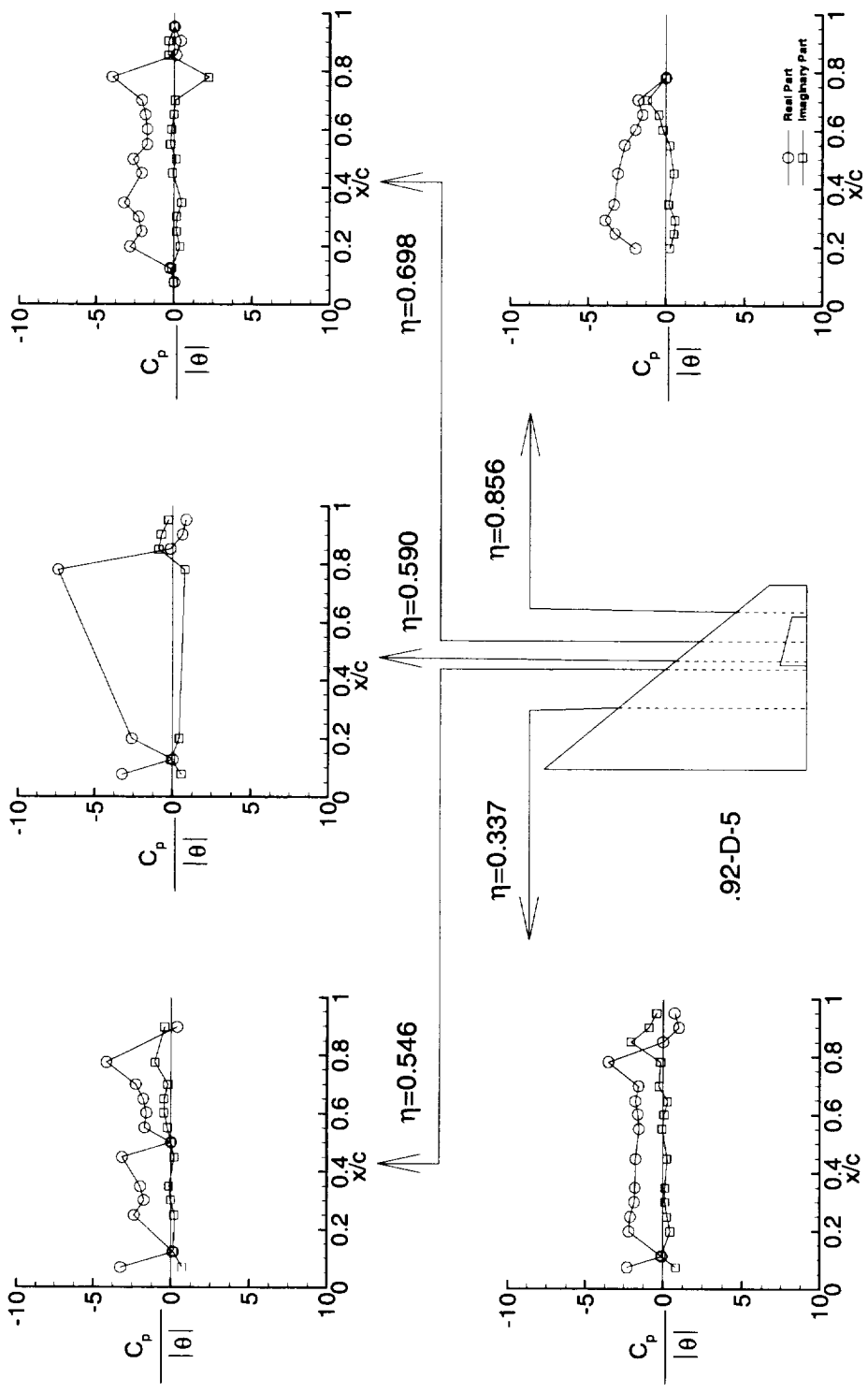
(d-2) Plot of data for test case 9E26 (point.92-D-5)
Figure 6. Continued.

.94-D-5

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.945	203.9	563.3	658.8	0.05	0.47	0.00	10.06*10**6

f = 7.98 Hz   k = 0.162

y/s = 0.337

	Upper		Lower			Upper		Lower	
x/c	Real	Imag	Real	Imag	x/c	Real	Imag	Real	Imag
.0731	-1.0737	1.0813			.0681	-0.2515	-0.0930		
.1120	-1.8698	0.2728			.1217	-3.2150	0.7600		
.1974	-1.8674	0.1930			.2485	-2.0958	0.2351		
.2478	-1.7889	0.1063			.3004	-1.7216	0.1809		
.2987	-1.7308	0.0302			.3481	-2.1696	0.3281		
.3486	-1.8145	-0.0824			.4487	-2.3619	-0.1197		
.4477	-1.3993	-0.0856			.4997	-1.9577	-0.1403		
.5506	-1.1634	-0.2114			.5500	-1.5962	0.0502		
.6009	-1.4447	-0.1315			.6014	-1.8297	0.2020		
.6459	-1.1174	-0.2539			.6494	-1.7658	0.0802		
.6979	-1.4083	-0.1282			.6995	-1.5444	-0.1080		
.7805	-1.6693	0.0525			.7747	-1.9738	0.0655		
.8500	-0.8413	-0.8990			.8964	0.0242	-0.6822		
.8996	0.0948	-0.5403							
.9495	0.4159	-0.2772							

y/s = 0.590

	Upper		Lower			Upper		Lower	
x/c	Real	Imag	Real	Imag	x/c	Real	Imag	Real	Imag
.0767	-2.1690	-0.0644			.0754	0.2965	0.4323		
.1271	-3.0201	0.6254			.1237	-3.2028	0.7042		
.1993	-2.3287	0.3356			.1980	-2.2198	0.2216		
.7802	-1.9749	0.0069			.2502	-2.3399	0.2459		
.8514	2.5984	-1.5214			.3001	-2.2053	0.0732		
.9016	0.4193	-0.5232			.3476	-2.8351	0.1734		
.9511	0.6466	-0.2190			.4495	-2.7339	0.3405		
					.4974	-2.5730	0.4306		
					.5484	-2.2611	0.3743		
					.6007	-1.9251	0.0639		
					.6514	-1.8404	-0.0353		
					.7000	-1.5972	-0.2788		
					.7795	-2.4741	0.0518		
					.8547	1.9277	-0.8250		
					.9033	0.5626	-0.3867		
					.9522	1.0574	-0.4089		

y/s = 0.698 (header for right column above)

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-2.8418	0.7455		
.2458	-2.9266	0.5318		
.2915	-3.6964	0.7252		
.3454	-3.9063	0.7947		
.4519	-2.8011	0.6005		
.5497	-2.7612	0.4869		
.6025	-2.4546	0.3144		
.6545	-1.8408	0.0064		
.7049	-1.5379	-0.1779		
.7808	0.0000	0.0000		

(e-1) Tabulated data for test case 9E27 (point.94-D-5)
Figure 6. Continued.
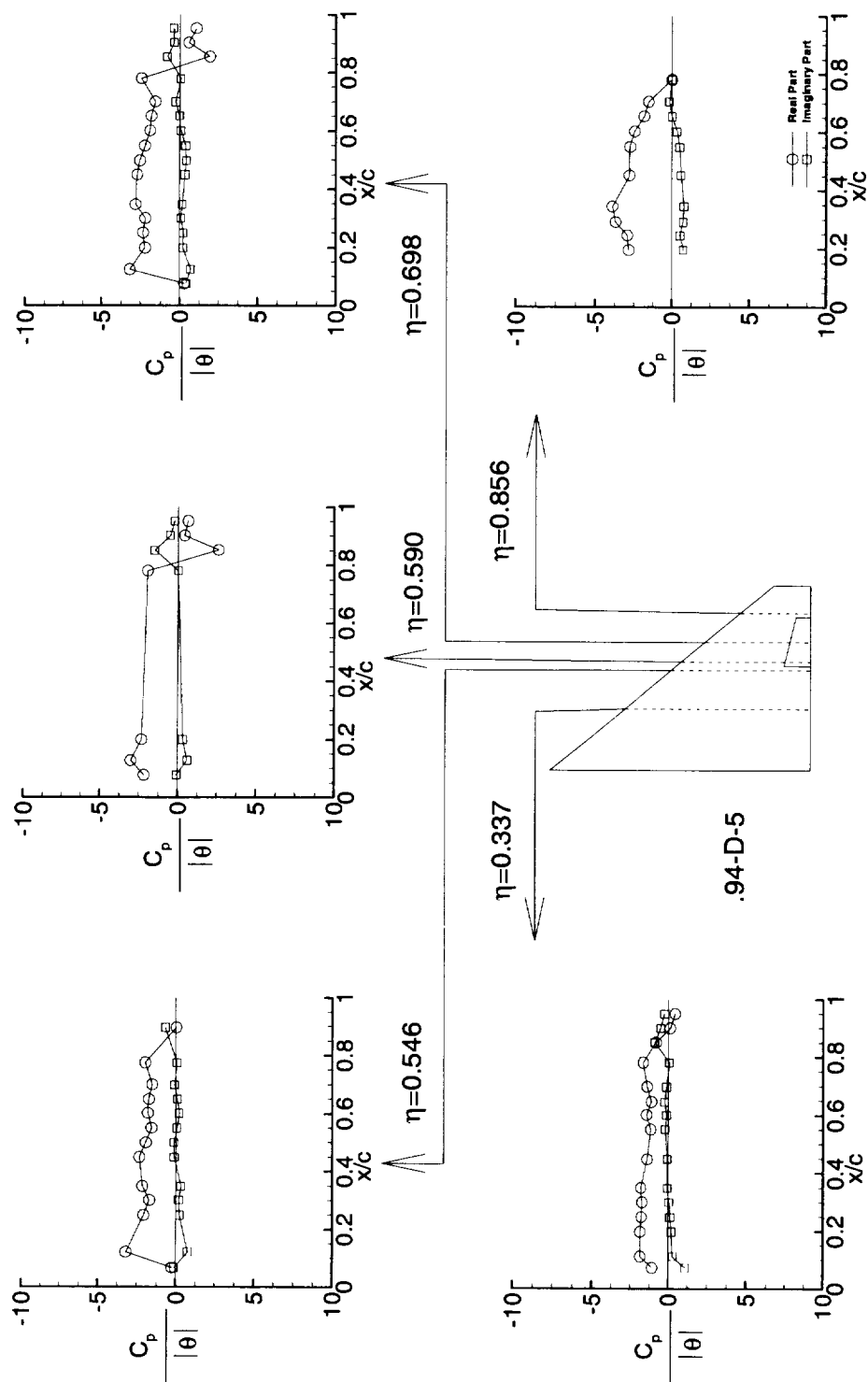
(e-2) Plot of data for test case 9E27 (point.94-D-5)
Figure 6. Continued.

49

.96-D-4

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.961	207.2	564.8	658.1	0.04	0.50	0.00	10.10*10**6

$f = 7.99$ Hz $k = 0.158$

y/s = 0.337

	Upper		Lower				Upper		Lower	
x/c	Real	Imag	Real	Imag		x/c	Real	Imag	Real	Imag
.0731	-2.0913	0.6835				.0681	-2.5140	0.7114		
.1120	-1.6958	0.3977				.1217	-1.9680	0.4907		
.1974	-1.7830	0.3144				.2485	-2.2143	0.1976		
.2478	-1.7751	0.2117				.3004	-1.6600	0.0725		
.2987	-0.7777	0.0489				.3481	-0.8700	-0.0395		
.3486	0.0000	0.0000				.4487	0.0000	0.0000		
.4477	-1.5920	-0.1983				.4997	-2.1969	0.1190		
.5506	-1.5520	-0.1412				.5500	-1.4061	-0.2733		
.6009	-1.3457	-0.4191				.6014	-1.3507	-0.4027		
.6459	-1.2125	-0.3001				.6494	-1.7615	-0.3043		
.6979	-1.7221	-0.1689				.6995	-1.4709	-0.2356		
.7805	-1.6091	-0.3656				.7747	-1.7811	-0.2535		
.8500	-1.4293	-0.7536				.8964	1.2107	0.5487		
.8996	5.0924	-1.2697								
.9495	0.6290	0.0396								

(at top of second column: y/s = 0.546)

y/s = 0.590

	Upper		Lower				Upper		Lower	
x/c	Real	Imag	Real	Imag		x/c	Real	Imag	Real	Imag
.0767	-3.0218	0.8097				.0754	-4.2733	1.0496		
.1271	-2.6513	0.4010				.1237	-2.7874	0.4915		
.1993	-2.0474	0.1252				.1980	-2.1942	0.2772		
.7802	-1.6133	-0.2874				.2502	-2.6866	0.5320		
.8514	-2.3245	1.0889				.3001	-1.0653	0.0298		
.9016	-0.0062	-0.0221				.3476	0.0343	0.0020		
.9511	1.5163	-0.8096				.4495	-2.6696	0.0466		
						.4974	-2.5553	0.0268		
						.5484	-2.3720	-0.0207		
						.6007	-1.7244	-0.2454		
						.6514	-1.6916	-0.2317		
						.7000	-1.6050	-0.1857		
						.7795	-2.3151	0.2270		
						.8547	-6.5505	3.3233		
						.9033	16.8142	-11.1164		
						.9522	3.0698	-2.0057		

(at top of second column: y/s = 0.698)

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-3.0564	0.5499		
.2458	-2.8014	0.3142		
.2915	-3.3182	0.4310		
.3454	-3.6068	0.5197		
.4519	-2.9820	0.5097		
.5497	-3.0320	0.3133		
.6025	-2.2689	0.0079		
.6545	-1.7199	-0.1899		
.7049	-1.4919	-0.2497		
.7808	-1.3271	-0.5688		

(f-1) Tabulated data for test case 9E28 (point.94-D-4)
Figure 6. Continued.

50
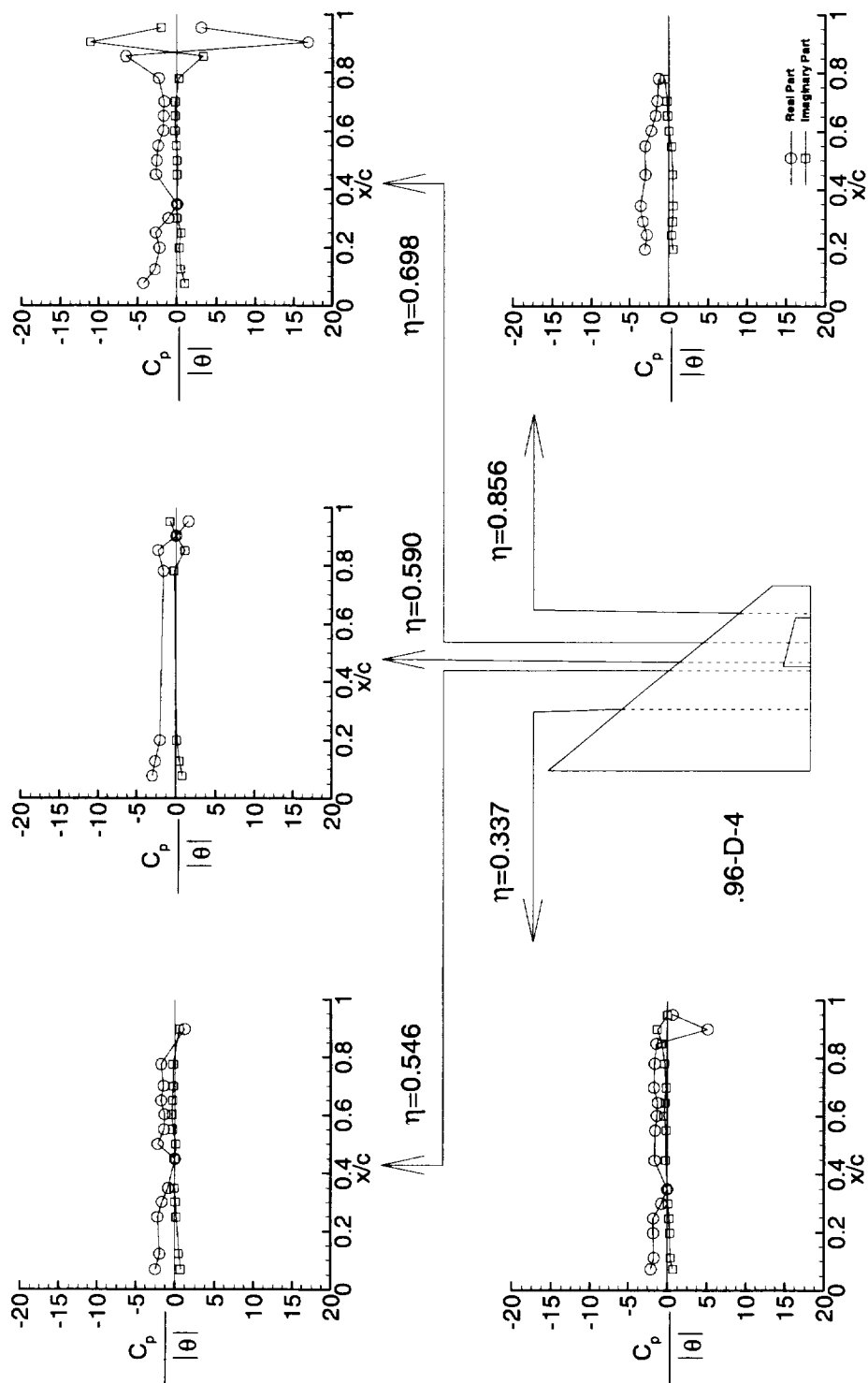
(f-2) Plot of data for test case 9E28 (point.96-D-4)
Figure 6. Continued.

51

1.12-D-5

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
1.120	232.4	575.4	646.1	0.00	0.47	0.00	9.67*10**6

f = 8.00 Hz   k = 0.136

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-1.7680	0.3597		
.1120	-2.3646	0.6424		
.1974	-1.7999	0.3859		
.2478	-1.7603	0.3358		
.2987	-0.9459	0.4231		
.3486	-1.6414	-0.2336		
.4477	-1.4125	-0.2720		
.5506	-1.4408	-0.1693		
.6009	-1.5846	0.0249		
.6459	-0.9547	-0.3703		
.6979	-1.2802	-0.3074		
.7805	-1.2994	-0.3312		
.8500	-1.1141	-0.5242		
.8996	-1.2943	-0.5388		
.9495	-1.2276	-0.5085		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-5.8878	4.2153		
.1217	-2.6376	0.4130		
.2485	-2.2896	0.3504		
.3004	-1.6289	0.1225		
.3481	-0.7635	-0.0829		
.4487	-2.0097	0.0842		
.4997	-1.6335	0.0114		
.5500	-1.7765	0.1087		
.6014	-1.9105	0.2447		
.6494	-1.3837	-0.2916		
.6995	-1.0776	-0.3522		
.7747	-1.3775	-0.2603		
.8964	-1.0775	-0.3110		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-2.4843	0.7124		
.1271	-2.5238	0.6106		
.1993	-2.3984	0.5581		
.7802	-1.3899	-0.1830		
.8514	-0.6703	-0.0176		
.9016	-1.1950	-0.2410		
.9511	-0.9949	-0.1844		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-3.1803	1.0211		
.1237	-1.0096	0.2331		
.1980	-2.8866	0.3954		
.2502	-1.2242	0.2181		
.3001	-0.8351	0.1011		
.3476	-1.6361	0.1777		
.4495	-1.6743	0.1642		
.4974	-2.4126	0.2536		
.5484	-2.9903	0.5219		
.6007	-1.3086	0.2307		
.6514	-1.7213	0.1839		
.7000	1.3880	-0.0689		
.7795	-0.5481	-0.2049		
.8547	0.6503	0.1632		
.9033	0.9514	0.1497		
.9522	0.0000	0.0000		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-3.1790	0.6989		
.2458	-2.6284	0.4682		
.2915	-2.6007	0.4119		
.3454	-2.4403	0.3299		
.4519	-2.5746	0.4911		
.5497	-2.4762	0.4858		
.6025	-1.6953	1.2545		
.6545	-2.4221	0.3706		
.7049	-2.3134	0.2636		
.7808	-2.5947	0.0997		

(g-1) Tabulated data for test case 9E29 (point 1.12-D-5)
Figure 6. Continued.
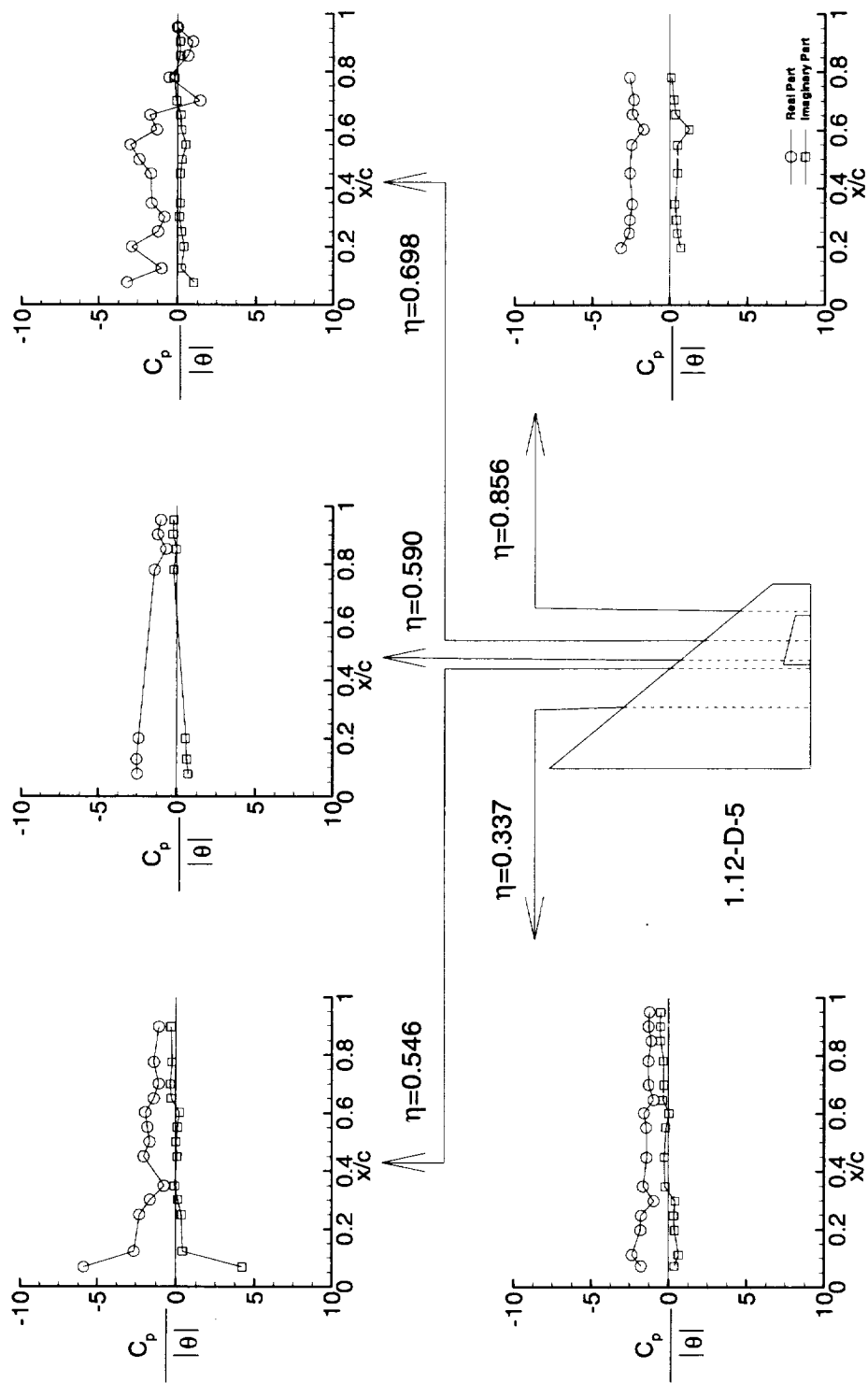
(g-2) Plot of data for test case 9E29 (point 1.12-D-5)
Figure 6. Continued.

53

.90-D-2

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.905	200.6	565.2	679.3	0.00	0.24	0.00	10.16*10**6

f = 7.99 Hz   k = 0.168

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-2.4706	0.5477		
.1120	-1.9283	0.1450		
.1974	-1.9301	0.1181		
.2478	-1.8859	0.0132		
.2987	-0.9044	-0.0712		
.3486	-1.9531	-0.1331		
.4477	-1.3880	-0.3538		
.5506	-1.6467	-0.2844		
.6009	-1.5743	-0.5606		
.6459	-1.3899	-0.7421		
.6979	-2.2528	-0.7146		
.7805	-0.5408	-1.3521		
.8500	0.7294	-0.5787		
.8996	0.6141	-0.2641		
.9495	0.3101	0.0131		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-3.2896	1.1520		
.1217	-2.7524	0.7944		
.2485	-1.9360	0.4221		
.3004	-1.4917	0.3307		
.3481	-0.9541	0.2185		
.4487	-2.3252	0.5411		
.4997	-1.4500	0.1345		
.5500	-1.6481	0.4882		
.6014	-1.7483	0.8264		
.6494	-3.2120	1.6366		
.6995	-4.4015	1.3625		
.7747	-1.0212	-2.3154		
.8964	0.0899	-0.2970		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-3.4570	1.1033		
.1271	-3.0337	0.8527		
.1993	-2.7310	0.6910		
.7802	2.9421	-3.0992		
.8514	0.6948	-0.3175		
.9016	0.9133	-0.4137		
.9511	0.7232	-0.1572		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-3.1090	0.5147		
.1237	-3.5516	1.0386		
.1980	-3.8563	1.0117		
.2502	-3.4947	0.7812		
.3001	-1.4205	0.1845		
.3476	-3.1097	0.3323		
.4495	-3.1663	0.4563		
.4974	-2.9750	0.4446		
.5484	-2.4825	0.0390		
.6007	-3.6046	-0.0440		
.6514	-4.2792	-1.6426		
.7000	-1.8661	-2.8301		
.7795	0.4883	-0.1933		
.8547	0.4710	-0.4743		
.9033	0.3958	-0.4142		
.9522	0.4764	-0.2211		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-1.9893	0.8118		
.2458	-2.4262	1.0049		
.2915	-3.7578	1.5951		
.3454	-0.8398	3.7263		
.4519	-3.5671	1.0702		
.5497	-4.6357	1.5691		
.6025	-5.6041	1.7562		
.6545	-4.8146	-1.4812		
.7049	1.6753	-4.8516		
.7808	1.0471	-0.5216		

(h-1) Tabulated data for test case 9E30 (point.90-D-2)
Figure 6.   Continued.

54
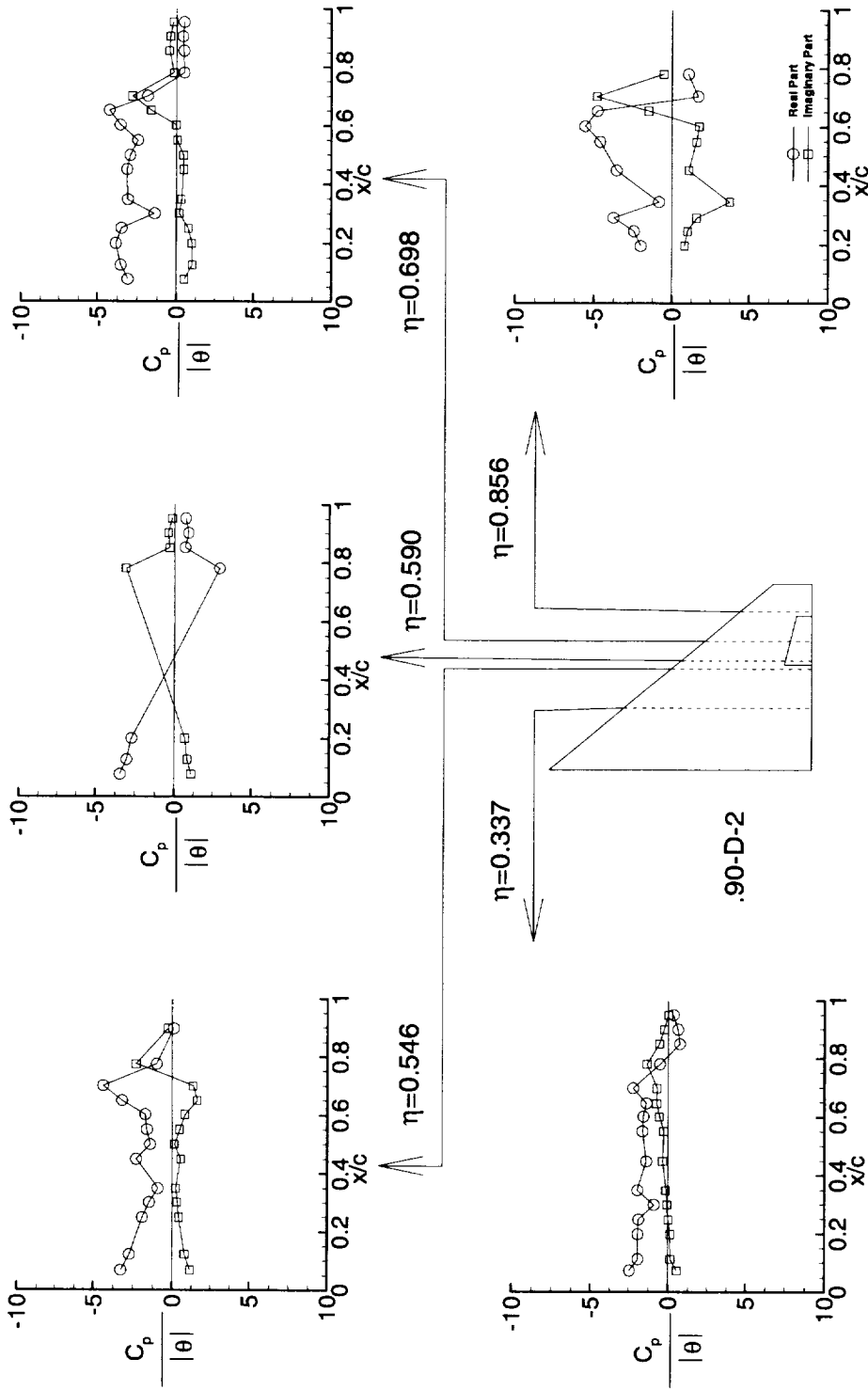
(h-2) Plot of data for test case 9E30 (point.90-D-2)
Figure 6. Continued.

55

.90-D-4

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.904	200.7	566.0	680.9	0.00	0.50	0.00	10.16*10**6

f = 4.01 Hz   k = 0.084

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-2.3063	0.3818		
.1120	-1.9035	0.1967		
.1974	-1.8852	0.1451		
.2478	-1.8898	0.0594		
.2987	-0.9396	0.0131		
.3486	-1.9472	-0.0578		
.4477	-1.4171	-0.1041		
.5506	-1.6436	-0.1467		
.6009	-1.4633	-0.3351		
.6459	-1.4833	-0.4394		
.6979	-2.4668	-0.5198		
.7805	0.0945	-1.2685		
.8500	0.6206	-0.2683		
.8996	0.4751	-0.2538		
.9495	0.3188	-0.1287		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-3.7350	0.5916		
.1217	-2.9958	0.4210		
.2485	-2.3230	0.1217		
.3004	-1.8558	0.0454		
.3481	-1.2144	0.0276		
.4487	-2.4266	-0.1144		
.4997	-1.6122	-0.1071		
.5500	-2.0053	-0.0070		
.6014	-1.9042	-0.1901		
.6494	-2.8022	-0.3988		
.6995	-2.4046	-1.3110		
.7747	0.3906	-0.9915		
.8964	0.2722	-0.1212		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-3.4732	0.4819		
.1271	-2.9950	0.3359		
.1993	-2.6492	0.2225		
.7802	0.7835	-0.4976		
.8514	0.2221	-0.0927		
.9016	0.4366	-0.1397		
.9511	0.4232	-0.0254		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-2.1350	0.1830		
.1237	-4.0190	0.5505		
.1980	-3.5918	0.3585		
.2502	-3.2092	0.2638		
.3001	-1.3628	0.0476		
.3476	-2.9666	0.0880		
.4495	-3.2309	0.0620		
.4974	-2.5315	-0.0707		
.5484	-2.2160	-0.4307		
.6007	-2.6140	-0.4845		
.6514	-2.1180	-1.2130		
.7000	-0.1434	-0.9054		
.7795	0.2450	-0.1249		
.8547	0.2968	0.0260		
.9033	0.3323	-0.0012		
.9522	0.4698	-0.0016		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-2.7454	0.1631		
.2458	-3.7066	0.2137		
.2915	-4.2658	0.2684		
.3454	-3.1768	2.1347		
.4519	-2.8293	-0.0790		
.5497	-3.1676	-0.3385		
.6025	-1.3419	-1.4747		
.6545	1.3149	-1.1597		
.7049	1.6409	-0.5843		
.7808	0.5124	0.0583		

(i-1) Tabulated data for test case 9E31 (point.90-D-4)
Figure 6. Continued.

56
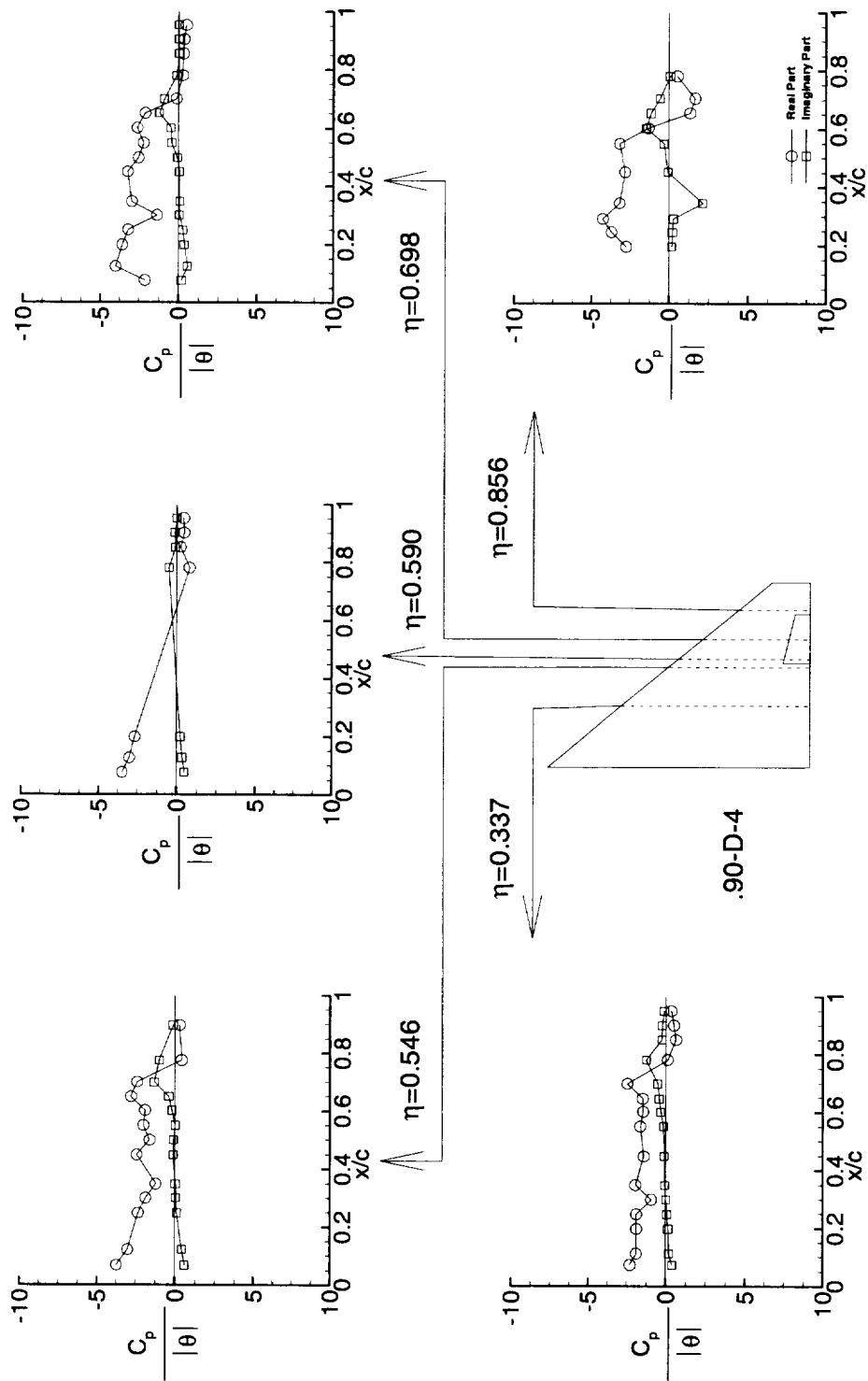
(i-2) Plot of data for test case 9E31 (point.90-D-4)
Figure 6. Continued.

57

MACH	q	To	H	ALPHAo	THETA	DELTA	RN
	psf	deg R	psf	deg	deg	deg	
0.909	202.0	564.7	680.6	0.00	0.46	0.00	10.21*10**6

f = 16.01 Hz   k = 0.335

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-3.2013	1.4454		
.1120	-2.9378	0.8258		
.1974	-2.8485	0.4054		
.2478	-2.8398	0.0198		
.2987	-1.4344	-0.1736		
.3486	-3.1015	-0.5580		
.4477	-2.3645	-1.0281		
.5506	-1.8315	-0.9861		
.6009	-1.7977	-1.1189		
.6459	-1.6743	-1.3366		
.6979	-1.5996	-0.1512		
.7805	-3.5021	0.2695		
.8500	-0.6506	-2.2105		
.8996	0.2051	-1.5434		
.9495	0.1874	-0.6589		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-4.4649	1.9136		
.1217	-4.0071	1.0214		
.2485	-2.9885	0.0730		
.3004	-2.8749	-0.2920		
.3481	-1.3599	-0.1670		
.4487	-3.1827	-0.5269		
.4997	-1.8978	-0.9670		
.5500	-1.8701	-0.5717		
.6014	-1.4292	-0.3431		
.6494	-1.6621	0.7680		
.6995	-2.9422	4.0053		
.7747	-6.3361	-2.2936		
.8964	-0.1796	-1.7345		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-4.1534	1.5529		
.1271	-3.6346	0.9197		
.1993	-3.2150	0.3891		
.7802	-5.4573	-2.0839		
.8514	-0.5436	-1.3387		
.9016	0.2406	-1.9156		
.9511	0.9513	-0.8974		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-3.0592	0.6447		
.1237	-4.7576	1.3015		
.1980	-4.2338	0.8691		
.2502	-3.6528	0.5851		
.3001	-1.5437	0.0485		
.3476	-3.4828	0.1825		
.4495	-2.7512	0.0913		
.4974	-2.3782	0.4279		
.5484	-2.0201	0.3781		
.6007	-2.1044	1.1095		
.6514	-3.8462	3.7272		
.7000	-9.4229	3.0435		
.7795	-3.3372	-2.6073		
.8547	-0.2002	-1.9578		
.9033	0.3603	-1.4634		
.9522	0.9940	-0.9064		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-2.6405	0.4466		
.2458	-3.3017	0.5703		
.2915	-3.9379	1.0404		
.3454	0.0108	2.0676		
.4519	-2.9237	0.6804		
.5497	-3.6609	1.8413		
.6025	-5.9939	3.4189		
.6545	-10.3521	1.9000		
.7049	-4.6050	-6.3383		
.7808	0.9068	-2.7306		

(j-1) Tabulated data for test case 9E32 (point.90-D-6)
Figure 6. Continued.
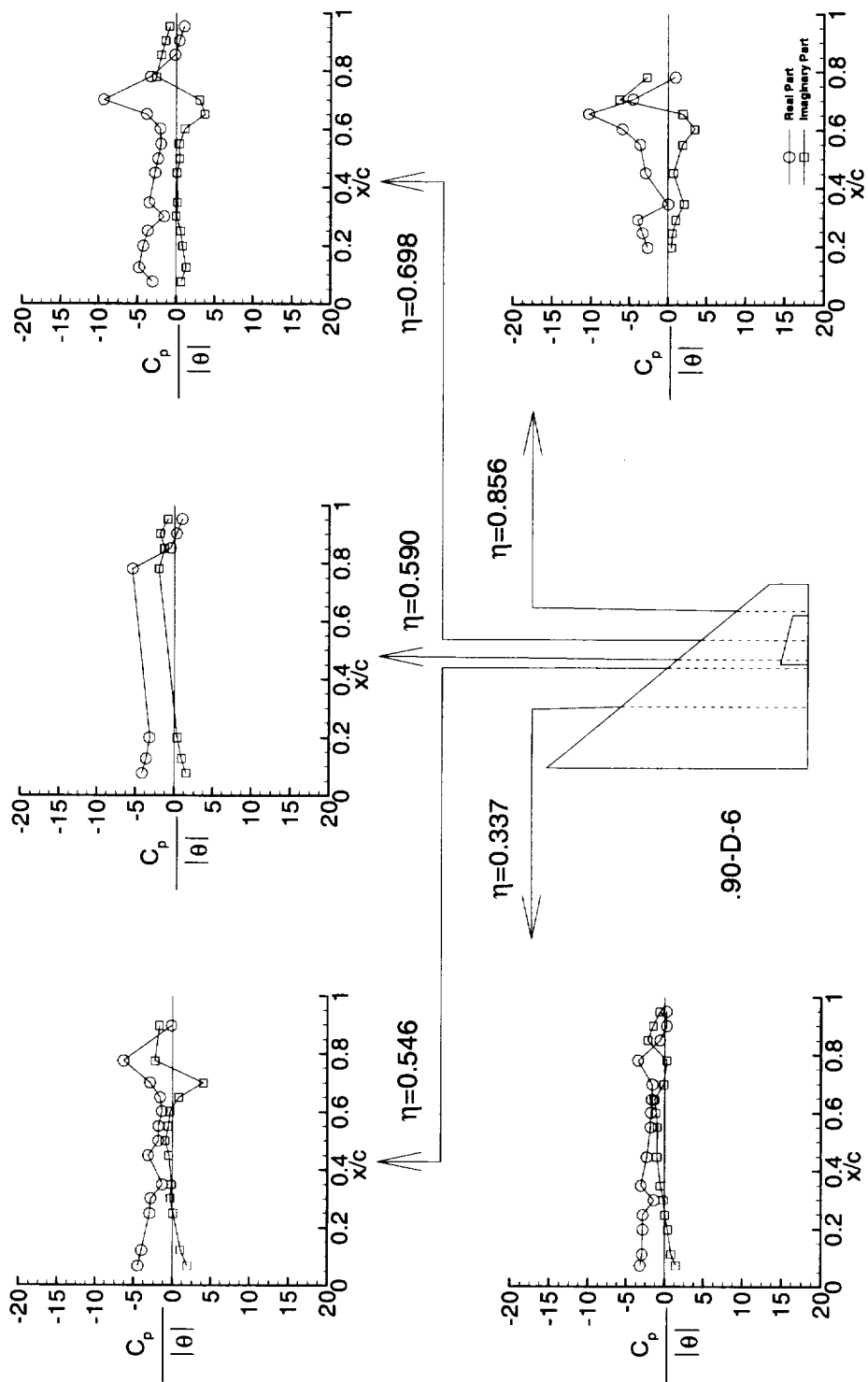
(j-2) Plot of data for test case 9E32 (point 90-D-6)
Figure 6. Continued.

.40-D-24

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.403	78.8	532.0	939.0	5.02	0.50	0.00	9.18*10**6

f = 4.00 Hz   k = 0.189

y/s = 0.337

x/c	Upper Real	Imag	Lower Real	Imag
.0731	-1.5540	3.2580	3.6177	0.4371
.1120	-11.3044	4.4757	-1.9249	-0.0302
.1974	0.2266	-0.9001	-1.7306	-0.1972
.2478	-0.2989	-0.8302	-1.6353	-0.2942
.2987	-0.5346	-0.7866	-1.5272	-0.3638
.3486	-0.8385	-0.9411	-1.6775	-0.5097
.4477	-0.7590	-0.7643	-1.2039	-0.5360
.5506	-0.5641	-0.6331	-0.9375	-0.5304
.6009	-0.6150	-0.6952	-0.9488	-0.5791
.6459	-0.4817	-0.6557	-0.8150	-0.5333
.6979	-0.3380	-0.5855	-0.6618	-0.5302
.7805	-0.1807	-0.4707	-0.4344	-0.4724
.8500	-0.1036	-0.3637	-0.2768	-0.3796
.8996	-0.0729	-0.2413	-0.2172	-0.2811
.9495	-0.0295	-0.0988	-0.1094	-0.1173

y/s = 0.546

x/c	Upper Real	Imag	Lower Real	Imag
.0681	-0.0439	1.3515	-3.4607	5.6474
.1217	-17.6871	3.5342	-2.1498	-0.1390
.2485	-5.2766	1.8169	-1.6719	-0.3462
.3004	-1.5772	0.4852	-1.4220	-0.3598
.3481	-0.4594	-0.3424	-1.4700	-0.4438
.4487	0.0961	-1.0383	-1.4917	-0.6209
.4997	-0.0590	-0.7770	-1.0469	-0.5450
.5500	-0.1625	-0.7269	-0.9540	-0.5244
.6014	-0.1932	-0.6359	-0.8630	-0.5647
.6494	-0.2565	-0.6131	-0.8261	-0.5980
.6995	-0.2689	-0.5189	-0.6323	-0.5120
.7747	0.0065	-0.4583	-0.4429	-0.4322
.8964	0.5757	-0.6226	-0.2784	-0.3641

y/s = 0.590

x/c	Upper Real	Imag	Lower Real	Imag
.0767	0.3357	2.8450	0.9253	-2.0842
.1271	-12.1279	0.4235	-1.9587	-0.2197
.1993	-8.8603	2.4405	-1.8502	-0.3296
.7802	-0.0404	-0.4566	-0.3898	-0.3376
.8514	-0.1924	-0.2122	-0.3154	-0.3786
.9016	-0.1929	-0.1438	-0.1993	-0.3480
.9511	-0.0059	-0.1030	-0.0232	-0.1703

y/s = 0.698

x/c	Upper Real	Imag	Lower Real	Imag
.0754	2.6415	-0.3005	1.3062	0.0180
.1237	-19.0148	-0.5311	-1.8982	-0.2432
.1980	-29.5325	3.5738	-2.0075	-0.2893
.2502	-24.2198	5.1039	-1.7701	-0.3217
.3001	-13.7670	4.0780	-1.6558	-0.3671
.3476	-6.7809	2.6711	-1.7234	-0.4297
.4495	2.4511	-0.6366	-1.3506	-0.4415
.4974	2.8416	-1.0709	-1.1845	-0.4311
.5484	2.6555	-1.1635	-0.8800	-0.3900
.6007	2.1359	-1.2733	-0.8585	-0.4095
.6514	1.6254	-1.1745	-0.7316	-0.4056
.7000	1.0208	-1.0373	-0.6123	-0.4037
.7795	0.7477	-0.5878	-0.3275	-0.3368
.8547	0.6925	-0.5652	-0.2122	-0.3268
.9033	0.7114	-0.3181	-0.0727	-0.3125
.9522	0.3365	-0.1726	0.3576	-0.2680

y/s = 0.856

x/c	Upper Real	Imag	Lower Real	Imag
.1955	0.6511	-3.5970	-1.9309	-0.3335
.2458	-10.5707	-0.6095	-1.7361	-0.3753
.2915	-19.4605	2.3894	-1.5954	-0.3742
.3454	-26.4105	4.8949	-1.5796	-0.3909
.4519	-21.5129	5.6037	-1.1363	-0.3957
.5497	-11.6255	3.3995	-0.8329	-0.3831
.6025	-6.9364	2.1605	-0.6511	-0.4069
.6545	-2.5283	0.6117	-0.5133	-0.4039
.7049	-1.2087	0.2658	-0.3308	-0.4250
.7808	0.0000	0.0000		

(k-1) Tabulated data for test case 9E33 (point.40-D-24)
Figure 6.   Continued.

60
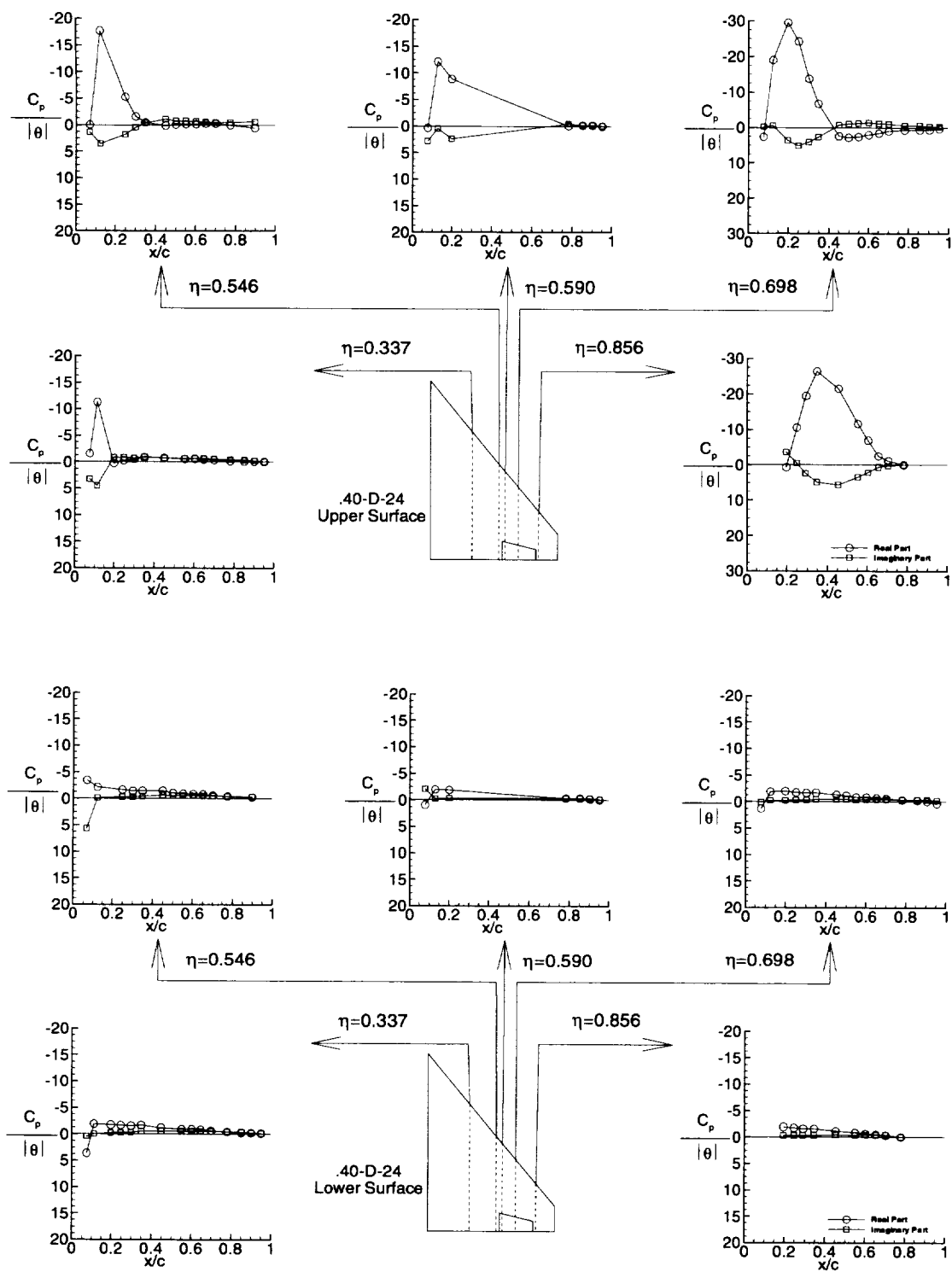
(k-2) Plot of data for test case 9E33 (point.40-D-24)
Figure 6. Continued.

61

.90-D-29

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.902	197.6	567.0	671.7	3.97	0.46	0.00	10.04*10**6

f = 7.99 Hz   k = 0.169

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-11.5701	6.2559	-0.3925	-0.2862
.1120	-0.6328	-0.2278	-2.4184	0.4832
.1974	-1.8694	0.2064	-2.3677	0.2322
.2478	-2.1264	0.2611	-2.3902	0.0793
.2987	-1.1890	0.1271	-1.2080	-0.0232
.3486	-2.7606	-0.1592	-2.4969	-0.1834
.4477	-0.6275	-0.9737	-2.1498	-0.3598
.5506	-1.0756	-0.2682	-1.8456	-0.6463
.6009	-1.0878	-0.2134	-2.2087	-0.7778
.6459	-1.0583	0.0314	-2.2687	-1.1163
.6979	-2.5399	0.4433	-1.8380	-1.1485
.7805	-0.5162	-2.1177	-0.7985	-1.5081
.8500	0.5380	-0.8828	0.1689	-0.8554
.8996	0.3977	-0.4792	0.3968	-0.3780
.9495	0.0547	-0.1119	0.4222	-0.0335

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-16.9167	6.9725	-0.1094	-0.8901
.1217	-16.9476	8.0111	-2.5253	0.4544
.2485	-0.9190	-1.1470	-2.3489	0.1560
.3004	-0.8554	-1.7308	-2.1998	0.1461
.3481	-0.4192	-0.3334	-1.2580	0.0000
.4487	-1.1719	-0.7098	-2.8273	-0.2673
.4997	-1.3068	-0.5227	-2.5630	-0.3785
.5500	-1.3045	-0.4188	-2.2618	-0.5014
.6014	-1.7017	0.2422	-2.4303	-0.6512
.6494	-1.6384	0.1376	-2.5587	-1.0808
.6995	-2.7819	-0.5710	-2.0214	-1.2779
.7747	-0.0367	-0.8587	-0.8318	-1.1661
.8964	0.1132	-0.0520	0.0163	-0.6724

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-15.8569	6.4711	-0.3001	-0.5740
.1271	-10.0087	3.7820	-2.6478	0.3064
.1993	-5.7552	1.4243	-2.7235	0.1523
.7802	-1.2814	0.0627	-0.2849	-0.7578
.8514	0.0110	-0.1990	0.0920	-0.3493
.9016	-0.1657	0.0863	0.4027	-0.4587
.9511	-0.3177	0.5065	0.3964	0.0417

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-9.1231	3.4473	-0.2362	-0.0153
.1237	-19.9762	7.3894	-2.7558	0.2266
.1980	-11.1473	4.5946	-3.2105	0.1402
.2502	-2.8698	0.6362	-2.9644	0.0052
.3001	-0.8251	-0.1248	-1.5437	-0.0485
.3476	-1.1886	-0.6561	-3.2946	-0.2015
.4495	-1.7625	-0.2571	-3.1597	-0.5856
.4974	-2.2959	0.3924	-3.0858	-0.7522
.5484	-1.9676	0.7123	-2.4403	-0.9416
.6007	-2.0317	0.6798	-2.5797	-1.0950
.6514	-3.5270	-1.8832	-2.0712	-1.2445
.7000	-2.5524	-6.1016	-1.5056	-1.6780
.7795	0.0789	-0.3141	-0.2744	-0.8013
.8547	0.6232	-0.3654	0.2637	-0.7523
.9033	0.3476	-0.2419	0.3712	-0.6486
.9522	0.0818	-0.0301	0.5680	-0.4049

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-20.5156	5.5355	-3.3122	0.0809
.2458	-19.1505	5.0956	-3.1005	-0.0758
.2915	-16.4535	4.8425	-2.8078	-0.2013
.3454	-10.2510	3.1928	-3.0542	-0.2457
.4519	-4.9161	1.5973	-2.7798	-0.3561
.5497	1.5150	-4.3261	-2.1513	-0.6742
.6025	1.7298	-4.8578	-2.3689	-0.4092
.6545	-2.3071	0.7186	-1.4526	-1.1349
.7049	-1.4642	0.8763	-0.0176	-1.5319
.7808	0.0705	-0.0247		

(1-1) Tabulated data for test case 9E (point.90-D-29)
Figure 6. Continued.
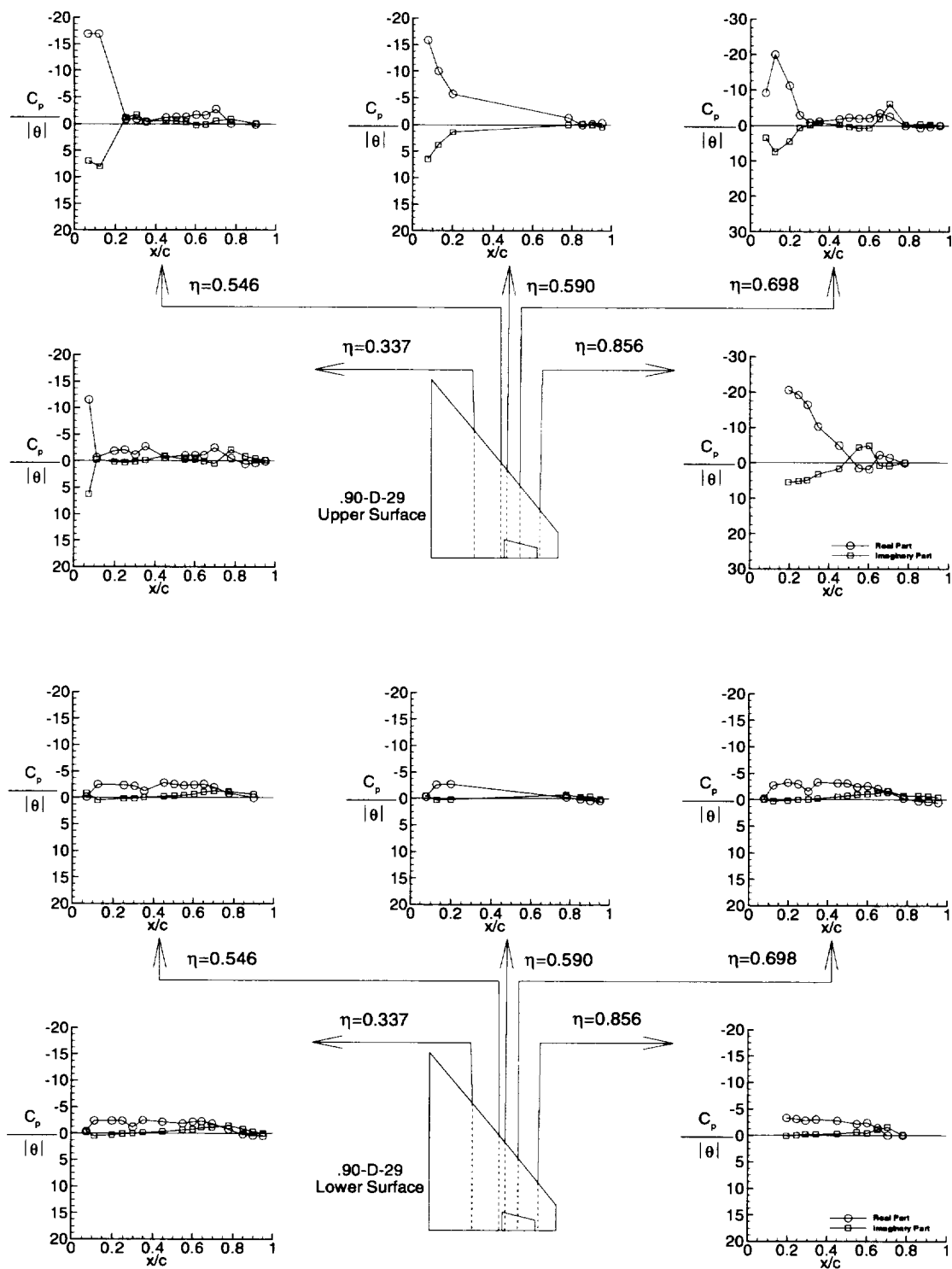
(1-2) Plot of data for test case 9E34 (point.90-D-29)
Figure 6. Continued.

63

.40-D-32

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.405	84.9	547.8	1004.3	0.05	0.00	3.90	9.46*10**6

f =   7.99 Hz   k = 0.376

y/s = 0.337

x/c	Upper Real	Imag	Lower Real	Imag
.0731	0.2898	-0.3475		
.1120	-0.0215	0.0200		
.1974	-0.0250	0.0205		
.2478	-0.0324	0.0202		
.2987	-0.0388	0.0210		
.3486	-0.0392	0.0259		
.4477	-0.0416	0.0185		
.5506	-0.0606	0.0117		
.6009	-0.0854	0.0146		
.6459	-0.0803	0.0178		
.6979	-0.0784	0.0123		
.7805	-0.0791	0.0061		
.8500	-0.0806	0.0052		
.8996	-0.0673	0.0060		
.9495	-0.0393	0.0056		

y/s = 0.546

x/c	Upper Real	Imag	Lower Real	Imag
.0681	0.6468	-0.3482		
.1217	0.0428	-0.0104		
.2485	-0.0653	0.0175		
.3004	-0.0434	0.0181		
.3481	-0.0879	0.0173		
.4487	-0.1261	0.0211		
.4997	-0.1151	0.0147		
.5500	-0.1378	0.0089		
.6014	-0.1792	0.0053		
.6494	-0.2307	0.0000		
.6995	-0.2585	-0.0059		
.7747	-0.3623	-0.0209		
.8964	-0.2062	-0.0533		

y/s = 0.590

x/c	Upper Real	Imag	Lower Real	Imag
.0767	-0.8055	0.0408		
.1271	-0.0594	0.0291		
.1993	-0.0699	0.0269		
.7802	-0.8175	-0.0357		
.8514	-0.6488	-0.1191		
.9016	-0.3240	-0.1463		
.9511	0.0097	-0.0906		

y/s = 0.698

x/c	Upper Real	Imag	Lower Real	Imag
.0754	0.0864	-0.5590		
.1237	-0.0787	0.0362		
.1980	-0.1024	0.0317		
.2502	-0.1128	0.0273		
.3001	-0.1299	0.0245		
.3476	-0.1624	0.0263		
.4495	-0.1989	0.0185		
.4974	-0.2434	0.0157		
.5484	-0.2600	-0.0064		
.6007	-0.3614	0.0038		
.6514	-0.4686	-0.0057		
.7000	-0.6608	-0.0196		
.7795	-1.1513	-0.0886		
.8547	-0.9503	-0.1420		
.9033	-0.4788	-0.1473		
.9522	-0.1406	-0.1063		

y/s = 0.856

x/c	Upper Real	Imag	Lower Real	Imag
.1955	-0.1698	0.0352		
.2458	-0.1928	0.0399		
.2915	-0.1982	0.0350		
.3454	-0.2256	0.0313		
.4519	-0.2535	0.0177		
.5497	-0.2849	0.0080		
.6025	-0.3320	0.0017		
.6545	-0.3820	-0.0027		
.7049	-0.4039	-0.0099		
.7808	0.0000	0.0000		

(m-1) Tabulated data for test case 9E35 (point.40-D-32)
Figure 6. Continued.

η=0.698

η=0.590

η=0.546

η=0.856

η=0.337

.40-D-32

Real Part
Imaginary Part
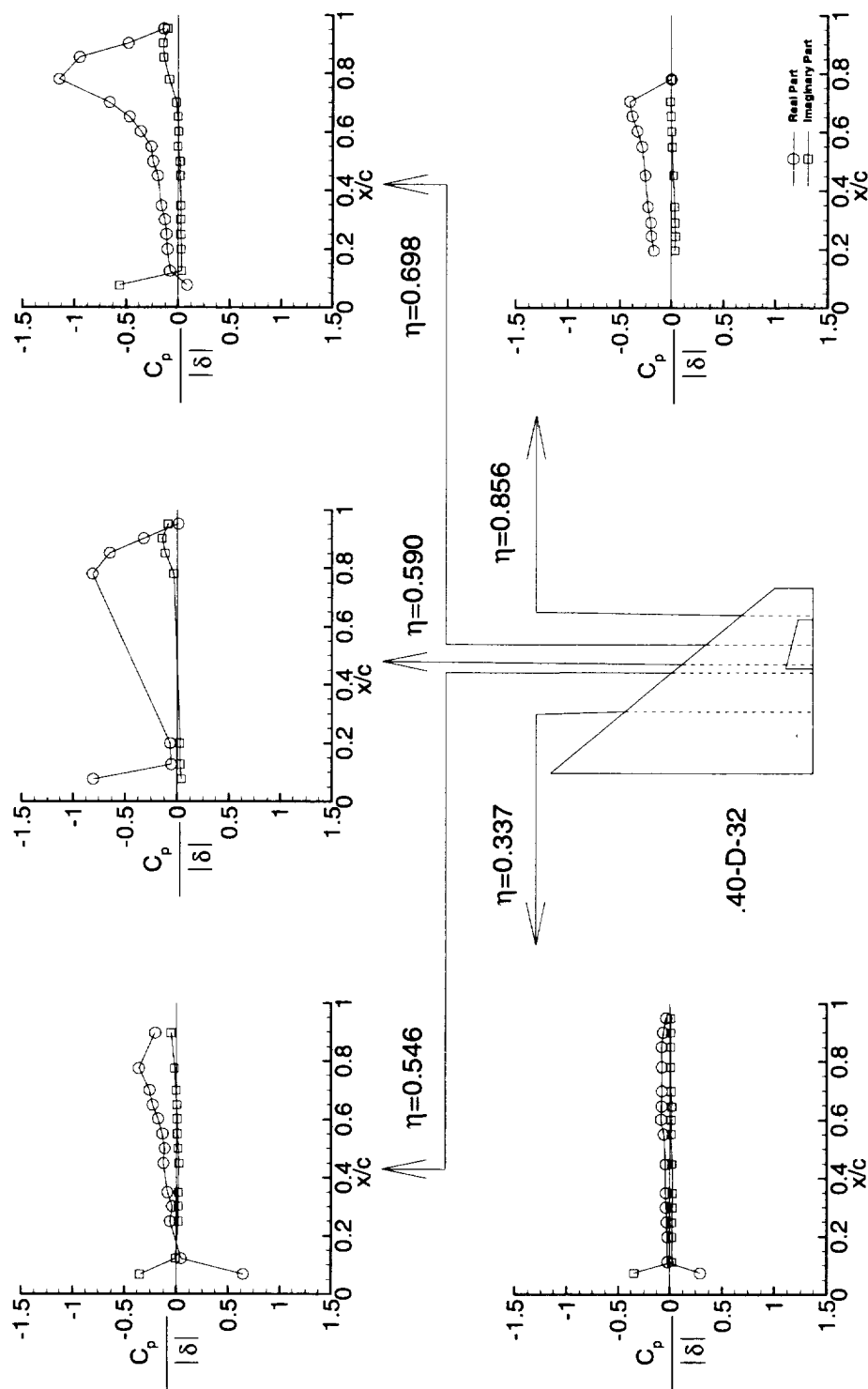
(m-2) Plot of data for test case 9E35 (point.40-D-32)
Figure 6. Continued.

65

.88-D-34

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.878	182.1	554.5	638.1	0.05	0.00	3.88	9.77*10**6

f = 16.00 Hz   k = 0.350

y/s = 0.337

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.0731	-0.0140	-0.0082		
.1120	-0.0014	-0.0004		
.1974	-0.0182	-0.0321		
.2478	-0.0067	-0.0453		
.2987	0.0067	-0.0512		
.3486	0.0359	-0.0842		
.4477	0.1200	-0.0808		
.5506	0.1844	0.0344		
.6009	0.2166	0.1462		
.6459	0.1852	0.3497		
.6979	-0.0123	0.4384		
.7805	-0.3896	0.3000		
.8500	-0.3237	0.0272		
.8996	-0.2015	-0.0305		
.9495	-0.0657	-0.0336		

y/s = 0.546

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.0681	-0.0283	-0.0745		
.1217	0.0012	-0.0009		
.2485	0.0836	-0.1033		
.3004	0.1578	-0.1119		
.3481	0.1653	-0.0822		
.4487	0.3089	0.0506		
.4997	0.2857	0.1696		
.5500	0.2204	0.2962		
.6014	0.1180	0.5017		
.6494	-0.2142	0.7374		
.6995	-0.5866	0.5745		
.7747	-0.9393	0.1826		
.8964	-0.3668	-0.1364		

y/s = 0.590

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.0767	0.0005	-0.0694		
.1271	-0.0014	-0.0003		
.1993	0.0760	-0.0633		
.7802	-1.4051	0.0786		
.8514	-1.0498	-0.2637		
.9016	-0.3201	-0.3190		
.9511	0.2211	-0.2089		

y/s = 0.698

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.0754	-0.0013	0.0007		
.1237	-0.0017	-0.0056		
.1980	0.1167	-0.0751		
.2502	0.1436	-0.0456		
.3001	0.1713	0.0002		
.3476	0.2341	0.0619		
.4495	0.2183	0.2640		
.4974	0.0825	0.3401		
.5484	0.0221	0.4528		
.6007	-0.2711	0.5709		
.6514	-0.7204	0.6002		
.7000	-1.3676	0.5332		
.7795	-1.8857	-0.0132		
.8547	-1.2584	-0.3184		
.9033	-0.3609	-0.3028		
.9522	0.1696	-0.2180		

y/s = 0.856

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.1955	0.1752	0.1495		
.2458	0.1916	0.2070		
.2915	0.1319	0.2308		
.3454	0.0693	0.3098		
.4519	-0.1690	0.3725		
.5497	-0.6030	0.4413		
.6025	0.0000	0.0000		
.6545	-1.1471	0.1673		
.7049	-1.1766	-0.0288		
.7808	0.0000	0.0000		

(n-1)   Tabulated data for test case 9E36 (point.88-D-34)
Figure 6. Continued.

66
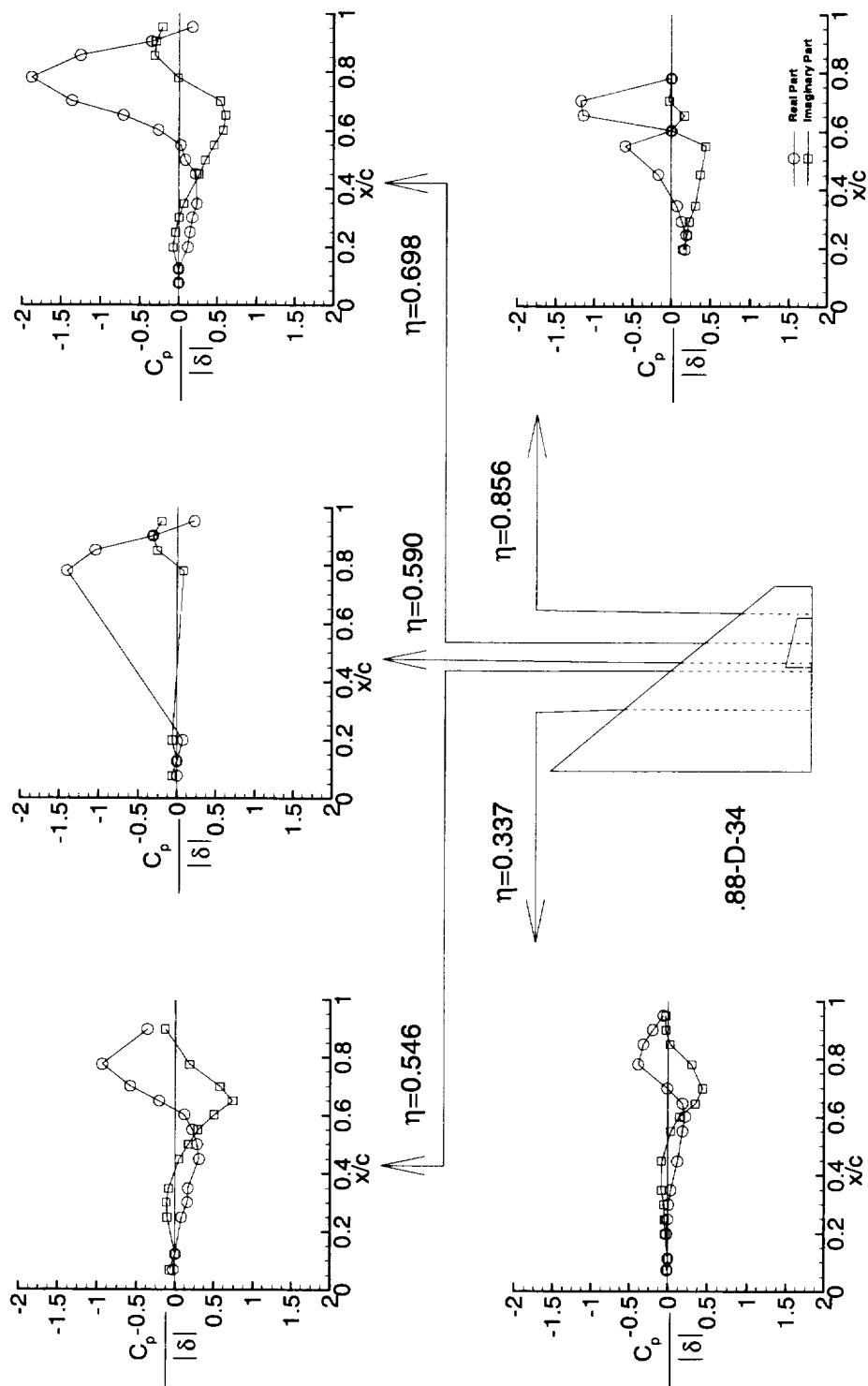
(n-2) Plot of data for test case 9E36 (point.88-D-34)
Figure 6. Continued.

.90-D-35

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.901	192.0	565.2	654.1	0.05	0.00	4.00	9.84*10**6

f = 16.00 Hz   k = 0.338

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-0.3013	0.0483		
.1120	-0.2954	0.0389		
.1974	-0.2567	0.0238		
.2478	-0.2545	0.0151		
.2987	-0.0003	0.0014		
.3486	-0.2807	0.0059		
.4477	-0.2034	0.0025		
.5506	-0.1782	-0.0175		
.6009	-0.2402	0.0139		
.6459	-0.3362	0.0563		
.6979	-0.2748	-0.0416		
.7805	0.0218	-0.1008		
.8500	0.0343	-0.0304		
.8996	0.0133	-0.0053		
.9495	-0.0012	0.0085		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-0.1346	0.0014		
.1217	-0.3132	0.0346		
.2485	-0.2704	0.0128		
.3004	-0.2546	0.0142		
.3481	-0.0008	0.0012		
.4487	-0.4544	0.0703		
.4997	-0.2319	0.0081		
.5500	-0.2116	-0.0122		
.6014	-0.2879	-0.0030		
.6494	-0.3553	-0.1293		
.6995	-0.2401	-0.1589		
.7747	0.0796	-0.0610		
.8964	0.0180	-0.0142		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-0.7556	0.1278		
.1271	-0.5800	0.0825		
.1993	-0.4027	0.0466		
.7802	0.0688	-0.0562		
.8514	-0.0005	0.0028		
.9016	0.0258	-0.0002		
.9511	0.0037	0.0123		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-0.2543	0.0182		
.1237	-0.1991	0.0010		
.1980	-0.2930	0.0195		
.2502	-0.3981	0.0489		
.3001	-0.0006	0.0013		
.3476	-0.4392	0.0547		
.4495	-0.3093	0.0070		
.4974	-0.3492	0.0140		
.5484	-0.3953	0.0048		
.6007	-0.4157	-0.0673		
.6514	-0.3653	-0.2793		
.7000	0.2386	-0.3260		
.7795	0.0521	-0.0096		
.8547	0.0902	0.0036		
.9033	0.0968	-0.0106		
.9522	-0.0052	0.0068		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-0.2882	0.0252		
.2458	-0.4349	0.0220		
.2915	-0.3566	0.0056		
.3454	-0.4440	0.0008		
.4519	-0.4439	0.0108		
.5497	-0.3540	-0.2255		
.6025	0.2054	-0.2757		
.6545	0.4322	-0.1017		
.7049	0.1496	0.0151		
.7808	0.0026	0.0199		

(o-1) Tabulated data for test case 9E37 (point.90-D-35)
Figure 6. Continued.

η=0.698

η=0.590

η=0.856

η=0.337

.90-D-35

η=0.546
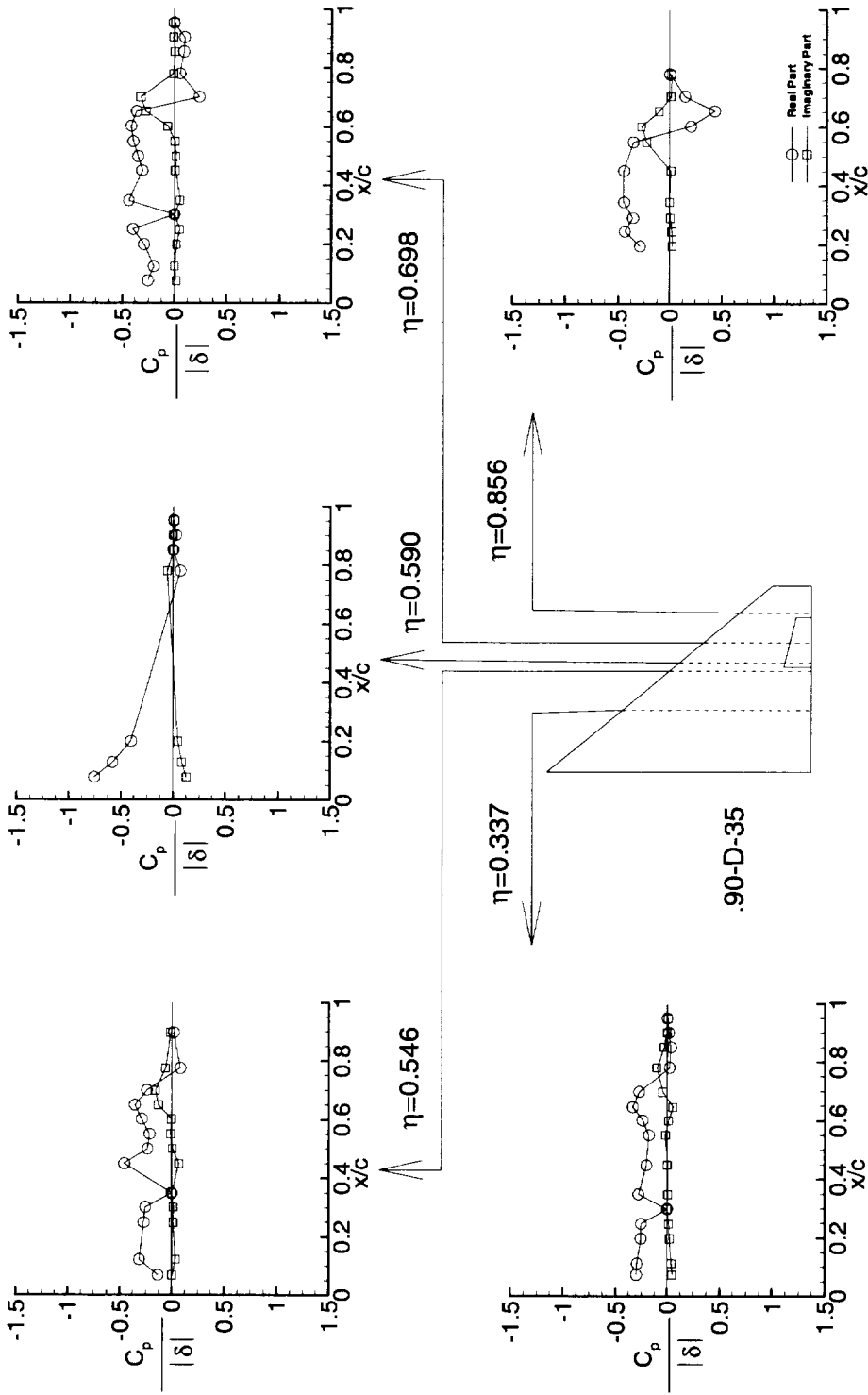
(o-2) Plot of data for test case 9E37 (point .90-D-35)
Figure 6. Continued.

69

.92-D-33

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.923	197.2	548.0	652.8	0.05	0.00	3.93	10.29*10**6

f = 15.98 Hz   k = 0.337

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	0.0204	0.0165		
.1120	-0.0014	0.0002		
.1974	0.0167	0.0307		
.2478	0.0045	0.0376		
.2987	-0.0003	0.0423		
.3486	0.0019	0.0393		
.4477	-0.0069	0.0358		
.5506	-0.0436	0.0266		
.6009	-0.0754	0.0228		
.6459	-0.0842	0.0074		
.6979	-0.0798	-0.0357		
.7805	0.2272	-0.0645		
.8500	-0.2878	0.3579		
.8996	-0.2581	0.0677		
.9495	-0.0912	-0.0109		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	0.0393	-0.0023		
.1217	0.0003	0.0014		
.2485	0.0211	0.0315		
.3004	0.0424	0.0284		
.3481	-0.0006	0.0437		
.4487	-0.0073	0.0593		
.4997	-0.0184	0.0331		
.5500	-0.0449	0.0211		
.6014	-0.0552	-0.0046		
.6494	-0.0616	-0.0179		
.6995	-0.0711	-0.0458		
.7747	-0.3536	0.9558		
.8964	-0.3878	-0.0339		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	0.0843	-0.0282		
.1271	-0.0007	-0.0013		
.1993	0.0379	0.0152		
.7802	-1.5885	1.3048		
.8514	-1.0553	-0.0239		
.9016	-0.3757	-0.2459		
.9511	0.1790	-0.2152		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-0.0014	0.0004		
.1237	-0.0018	0.0071		
.1980	0.0260	0.0296		
.2502	0.0125	0.0247		
.3001	0.0057	0.0286		
.3476	0.0073	0.0327		
.4495	-0.0205	0.0139		
.4974	-0.0328	0.0121		
.5484	-0.0114	-0.0220		
.6007	-0.0242	-0.0273		
.6514	-0.0134	-0.0416		
.7000	-0.0812	0.1841		
.7795	-2.4117	1.0889		
.8547	-1.3200	-0.3096		
.9033	-0.3826	-0.3421		
.9522	0.1716	-0.2932		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-0.0045	-0.0037		
.2458	-0.0193	-0.0131		
.2915	-0.0096	-0.0128		
.3454	-0.0026	-0.0349		
.4519	0.0072	-0.0490		
.5497	0.0349	-0.0624		
.6025	0.0429	-0.0534		
.6545	0.0104	0.0869		
.7049	-1.3154	1.9949		
.7808	0.0000	0.0000		

(p-1) Tabulated data for test case 9E38 (point.92-D-33)
Figure 6. Continued.

70
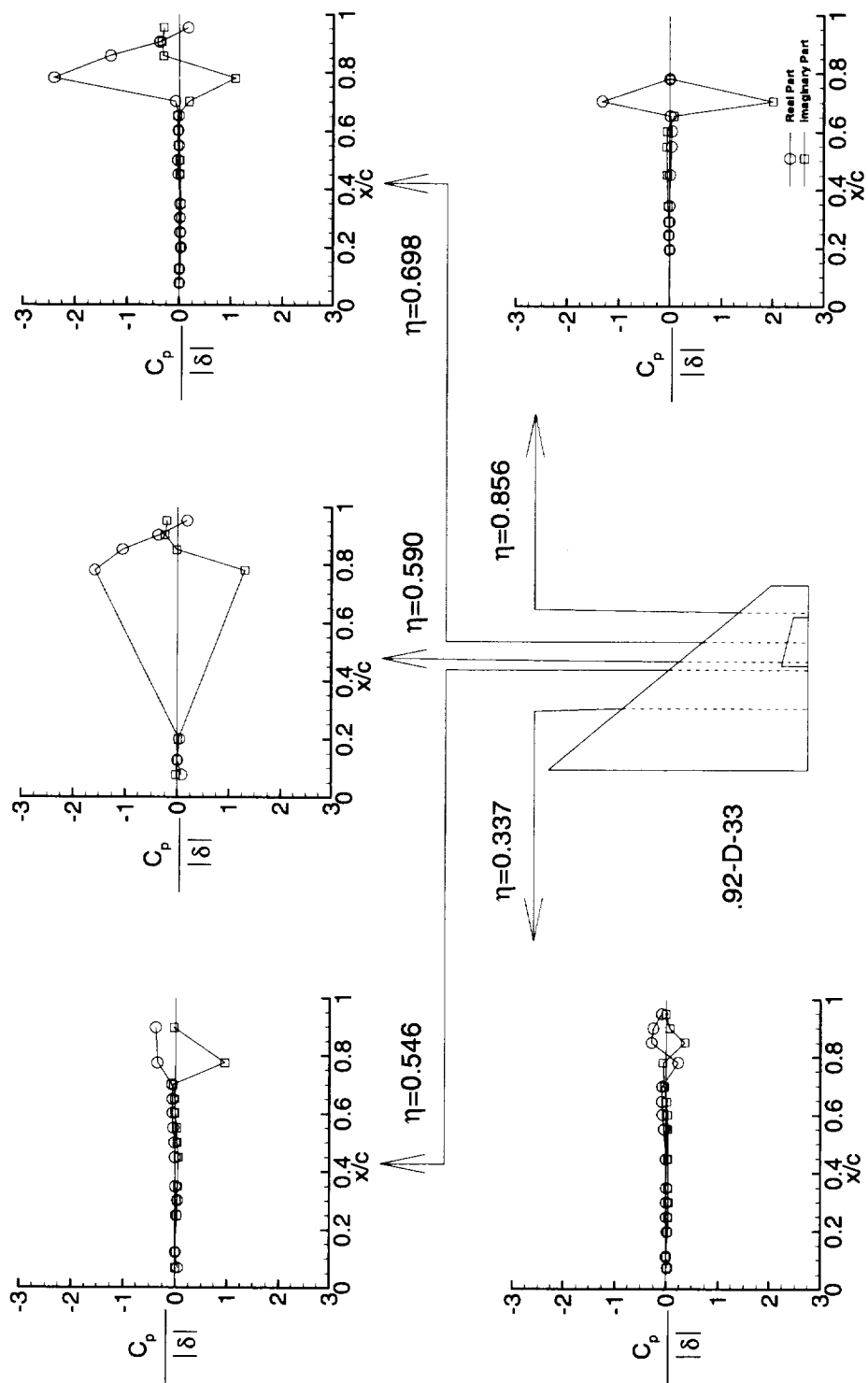
(p-2) Plot of data for test case 9E38 (point.92-D-33)
Figure 6. Continued.

.94-D-34

MACH	q	To	H	ALPHAo	THETA	DELTA	RN
	psf	deg R	psf	deg	deg	deg	
0.942	203.4	561.3	659.1	0.05	0.00	3.96	10.06*10**6

f = 15.98 Hz   k = 0.326

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	0.0198	-0.0381		
.1120	0.0017	-0.0039		
.1974	0.0071	-0.0006		
.2478	0.0057	-0.0008		
.2987	0.0044	-0.0036		
.3486	0.0079	-0.0034		
.4477	0.0058	-0.0042		
.5506	0.0054	-0.0067		
.6009	0.0009	-0.0100		
.6459	0.0204	-0.0104		
.6979	0.0224	-0.0155		
.7805	0.0411	-0.0057		
.8500	0.2525	0.5806		
.8996	-0.2073	0.0277		
.9495	-0.0652	-0.0329		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-0.0273	0.0232		
.1217	0.0090	0.0044		
.2485	0.0057	0.0007		
.3004	0.0243	0.0021		
.3481	0.0044	-0.0057		
.4487	0.0140	-0.0028		
.4997	0.0167	-0.0040		
.5500	0.0155	-0.0025		
.6014	0.0257	-0.0014		
.6494	0.0276	0.0076		
.6995	0.0306	0.0157		
.7747	0.0255	0.0272		
.8964	-0.3824	-0.0476		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	0.0195	-0.0048		
.1271	0.0016	0.0023		
.1993	0.0016	0.0023		
.7802	-0.2014	0.0826		
.8514	-0.9311	-0.0032		
.9016	-0.4574	-0.2221		
.9511	0.0182	-0.1983		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-0.0203	-0.0159		
.1237	0.0013	-0.0056		
.1980	0.0071	-0.0048		
.2502	0.0083	-0.0079		
.3001	0.0097	-0.0061		
.3476	0.0141	-0.0070		
.4495	0.0195	-0.0045		
.4974	0.0214	0.0016		
.5484	0.0301	0.0093		
.6007	0.0220	0.0134		
.6514	0.0230	0.0194		
.7000	0.0181	0.0240		
.7795	-1.1054	0.3380		
.8547	-1.0257	-0.3937		
.9033	-0.3794	-0.3298		
.9522	0.0323	-0.3120		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	0.0183	0.0034		
.2458	0.0178	0.0053		
.2915	0.0282	0.0104		
.3454	0.0286	0.0132		
.4519	0.0206	0.0178		
.5497	0.0173	0.0263		
.6025	0.0077	0.0246		
.6545	-0.0013	0.0286		
.7049	-0.0027	0.0271		
.7808	0.0000	0.0000		

(q-1) Tabulated data for test case 9E39 (point.94-D-34)
Figure 6. Continued.

72
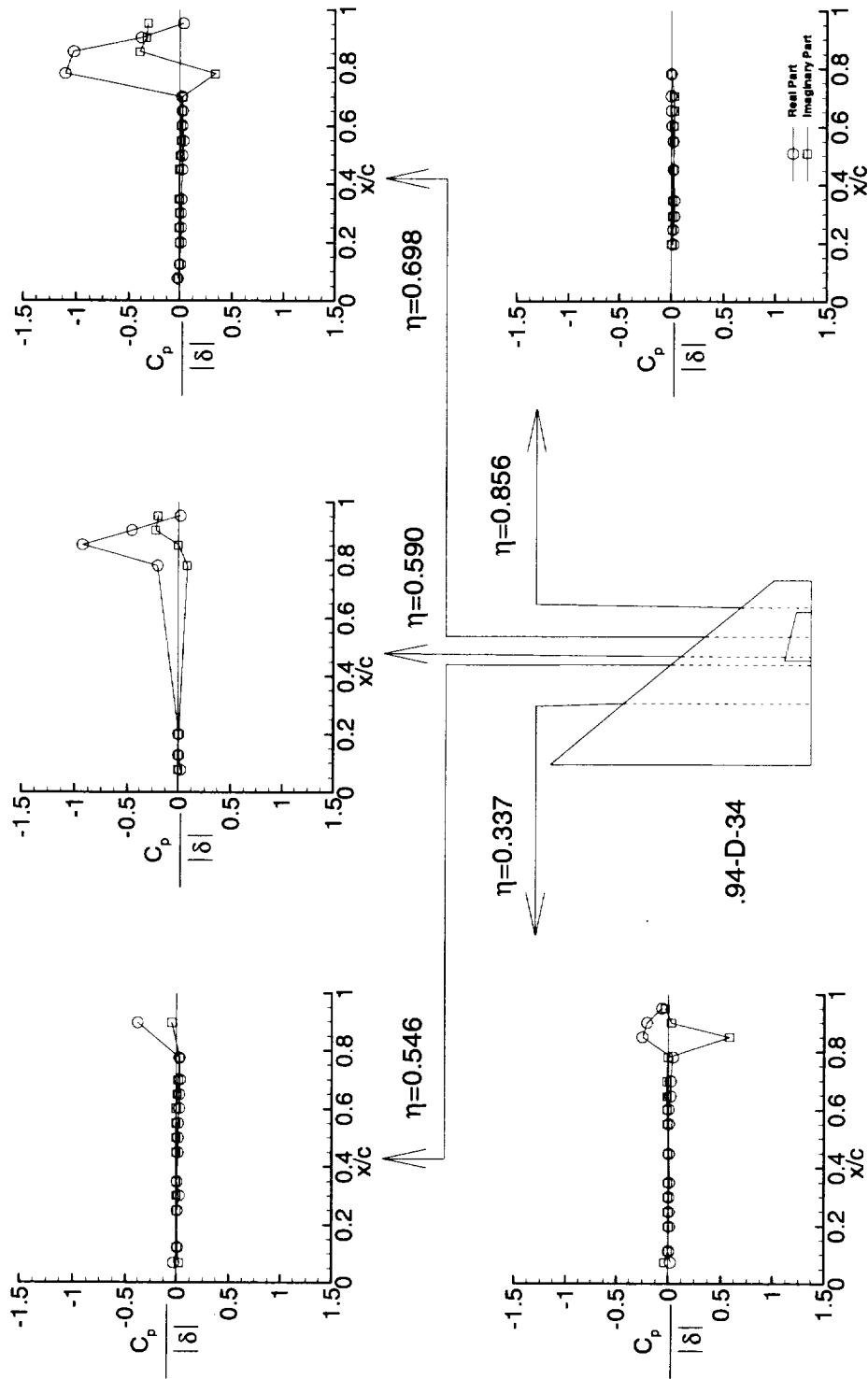
(q-2) Plot of data for test case 9E39 (point.94-D-34)
Figure 6. Continued.

.96-D-10

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.960	200.6	569.3	638.1	0.05	0.00	4.54	9.59*10**6

f = 16.00 Hz   k = 0.315

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	0.0033	0.0019		
.1120	-0.0020	0.0046		
.1974	-0.0046	0.0043		
.2478	-0.0037	0.0035		
.2987	-0.0020	0.0015		
.3486	-0.0052	0.0055		
.4477	-0.0025	0.0003		
.5506	-0.0028	-0.0042		
.6009	0.0003	-0.0088		
.6459	0.0014	0.0021		
.6979	0.0025	-0.0004		
.7805	0.0044	0.0061		
.8500	0.0056	0.0068		
.8996	-0.3328	0.2220		
.9495	-0.0555	-0.0026		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-0.0008	-0.0024		
.1217	-0.0113	0.0009		
.2485	0.0003	-0.0025		
.3004	-0.0003	0.0114		
.3481	0.0002	-0.0025		
.4487	0.0006	0.0011		
.4997	0.0032	0.0039		
.5500	0.0012	0.0004		
.6014	0.0019	0.0017		
.6494	0.0011	0.0006		
.6995	0.0012	0.0062		
.7747	0.0017	0.0061		
.8964	-0.2912	-0.1935		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-0.0050	-0.0007		
.1271	-0.0038	0.0001		
.1993	-0.0007	-0.0024		
.7802	-0.0802	0.0305		
.8514	-0.7036	0.1496		
.9016	0.4681	-0.9031		
.9511	-0.1500	-0.3338		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	0.0058	0.0067		
.1237	0.0035	0.0052		
.1980	0.0006	0.0063		
.2502	0.0016	0.0074		
.3001	0.0003	0.0025		
.3476	0.0001	0.0088		
.4495	0.0016	0.0074		
.4974	0.0025	0.0044		
.5484	-0.0002	0.0088		
.6007	-0.0011	0.0049		
.6514	-0.0013	0.0049		
.7000	-0.0021	0.0046		
.7795	-0.5026	0.2113		
.8547	-0.3777	-0.2315		
.9033	1.0289	-1.8046		
.9522	0.0000	0.0000		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-0.0015	0.0048		
.2458	0.0003	0.0012		
.2915	-0.0005	0.0050		
.3454	0.0007	0.0113		
.4519	0.0008	0.0063		
.5497	0.0000	0.0000		
.6025	0.0024	0.0044		
.6545	-0.0013	0.0075		
.7049	-0.0043	0.0105		
.7808	-0.0056	0.0030		

(r-1) Tabulated data for test case 9E40 (point.96-D-10)
Figure 6. Continued.
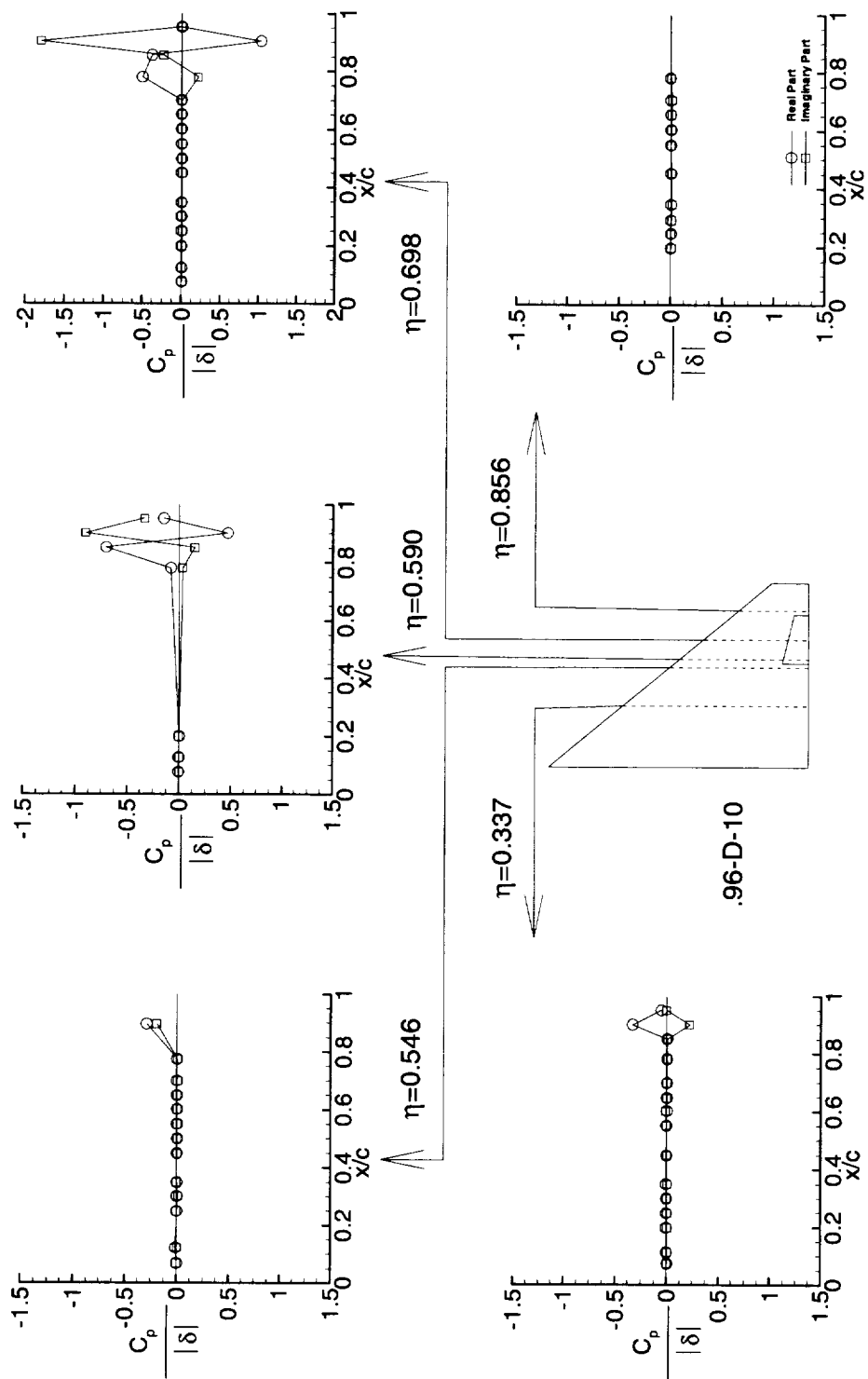
(r-2) Plot of data for test case 9E40 (point .96-D-10)
Figure 6. Continued.

1.12-D-11

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
1.120	231.7	572.5	643.8	0.00	0.00	4.37	9.76*10**6

$f = 16.01$ Hz $k = 0.273$

y/s = 0.337

	Upper		Lower				Upper		Lower	
x/c	Real	Imag	Real	Imag		x/c	Real	Imag	Real	Imag
.0731	0.0004	-0.0079				.0681	0.0030	0.0087		
.1120	0.0049	-0.0061				.1217	0.0057	0.0033		
.1974	-0.0007	-0.0052				.2485	0.0026	0.0005		
.2478	-0.0030	0.0025				.3004	0.0179	-0.0039		
.2987	0.0010	0.0052				.3481	-0.0013	-0.0001		
.3486	0.0000	0.0000				.4487	0.0000	0.0000		
.4477	0.0118	0.0005				.4997	0.0073	0.0056		
.5506	0.0092	0.0004				.5500	0.0029	0.0026		
.6009	0.0050	-0.0017				.6014	0.0066	-0.0002		
.6459	0.0129	0.0025				.6494	0.0079	-0.0003		
.6979	0.0046	0.0026				.6995	0.0103	0.0018		
.7805	0.0104	-0.0012				.7747	0.0075	0.0024		
.8500	-0.0023	-0.0032				.8964	-0.2583	0.0027		
.8996	-0.0035	0.0018								
.9495	0.0006	-0.0025								

(titles: y/s = 0.337 (left, Upper), y/s = 0.546 (right, Upper))

y/s = 0.590

	Upper		Lower				Upper		Lower	
x/c	Real	Imag	Real	Imag		x/c	Real	Imag	Real	Imag
.0767	-0.0009	0.0025				.0754	0.0039	-0.0006		
.1271	0.0039	-0.0002				.1237	0.0038	0.0010		
.1993	0.0104	-0.0014				.1980	0.0067	-0.0041		
.7802	0.0009	0.0009				.2502	0.0064	-0.0045		
.8514	-0.3985	-0.0070				.3001	0.0039	-0.0006		
.9016	-0.0010	0.0009				.3476	0.0090	-0.0019		
.9511	-0.4660	-0.0261				.4495	0.0105	0.0004		
						.4974	0.0076	0.0019		
						.5484	0.0104	-0.0017		
						.6007	0.0046	-0.0025		
						.6514	0.0065	-0.0010		
						.7000	0.0039	-0.0007		
						.7795	-0.0222	0.0021		
						.8547	-1.2507	0.0131		
						.9033	-1.2350	0.0108		
						.9522	-1.1970	0.0063		

(titles: y/s = 0.590 (left, Upper), y/s = 0.698 (right, Upper))

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	0.0052	0.0008		
.2458	0.0091	-0.0009		
.2915	0.0105	0.0008		
.3454	0.0117	0.0011		
.4519	0.0079	0.0004		
.5497	0.0052	-0.0003		
.6025	0.0051	0.0014		
.6545	0.0065	0.0009		
.7049	0.0092	0.0002		
.7808	0.0008	-0.0010		

(s-1) Tabulated data for test case 9E41 (point 1.12-D-11)
Figure 6. Continued.

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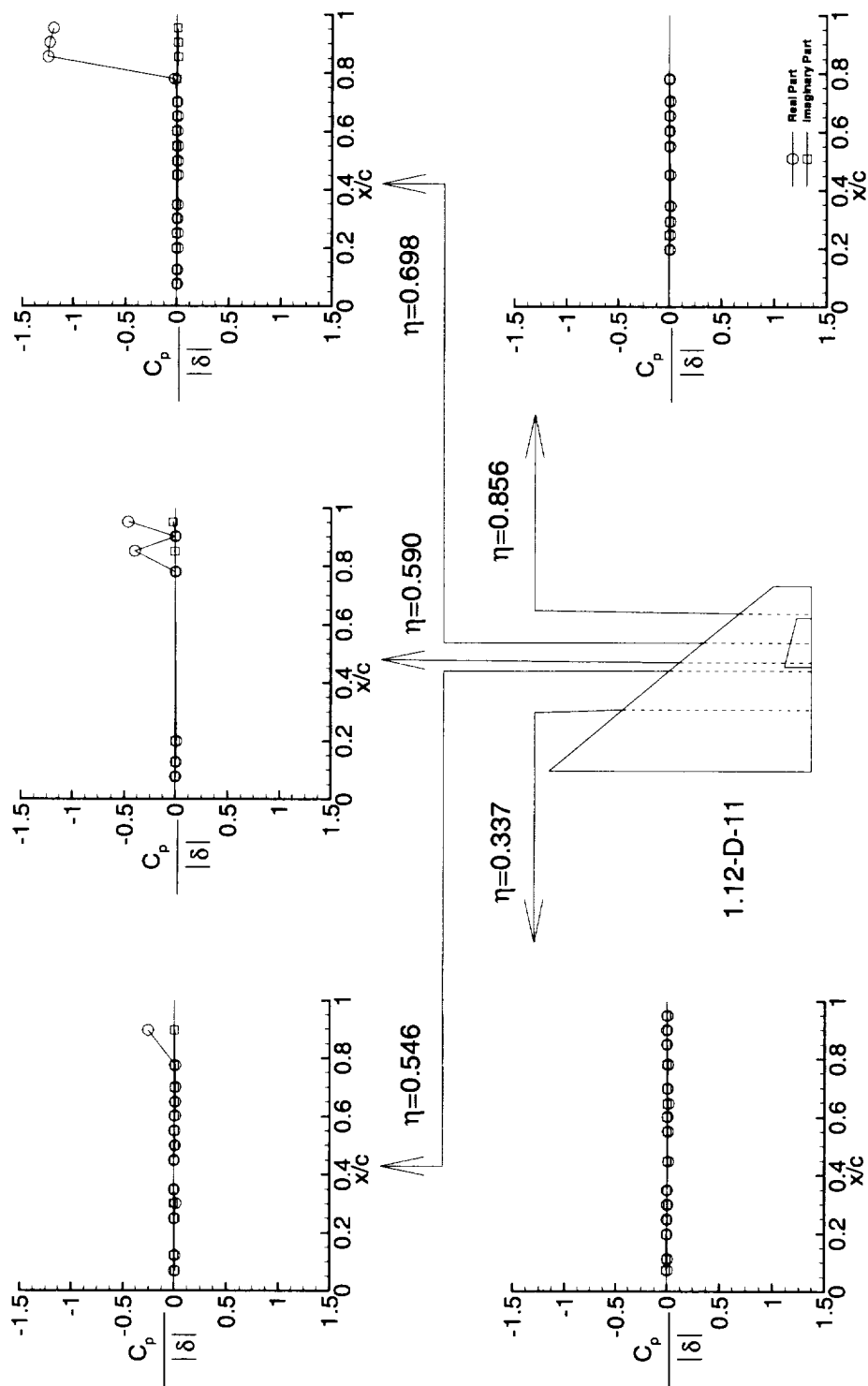
(s-2) Plot of data for test case 9E41 (point 1.12-D-11)
Figure 6. Continued.

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.90-D-32

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.898	190.9	563.9	652.4	0.05	0.00	3.48	9.81*10**6

f = 7.99 Hz   k = 0.170

y/s = 0.337

	Upper		Lower			Upper		Lower	
x/c	Real	Imag	Real	Imag	x/c	Real	Imag	Real	Imag
.0731	-0.3800	0.1862			.0681	-0.2389	0.0264		
.1120	-0.3899	0.1512			.1217	-0.4409	0.1099		
.1974	-0.3567	0.0719			.2485	-0.3847	0.0215		
.2478	-0.3654	0.0358			.3004	-0.4528	0.0669		
.2987	0.0000	0.0000			.3481	-0.0013	0.0010		
.3486	-0.4029	-0.0552			.4487	-0.4857	0.0034		
.4477	-0.3154	-0.0682			.4997	-0.3350	-0.0240		
.5506	-0.2580	-0.1085			.5500	-0.2457	-0.0856		
.6009	-0.2129	-0.1151			.6014	-0.3175	-0.0139		
.6459	-0.2006	0.0095			.6494	-0.3643	0.0577		
.6979	-0.1408	0.0558			.6995	-0.9266	0.4203		
.7805	-0.7221	-0.1028			.7747	-0.2578	-0.4595		
.8500	-0.0935	-0.3465			.8964	0.0624	-0.2064		
.8996	0.0246	-0.2242							
.9495	0.0247	-0.0905							

The heading for the right table: y/s = 0.546

y/s = 0.590

	Upper		Lower			Upper		Lower	
x/c	Real	Imag	Real	Imag	x/c	Real	Imag	Real	Imag
.0767	-0.9296	0.4675			.0754	-0.4464	0.0851		
.1271	-0.7527	0.2904			.1237	-0.3361	-0.0312		
.1993	-0.5449	0.1208			.1980	-0.3833	-0.0161		
.7802	-0.2280	-0.3855			.2502	-0.4615	0.0640		
.8514	-0.0006	0.0015			.3001	0.0000	0.0000		
.9016	0.0759	-0.1535			.3476	-0.4957	0.0390		
.9511	0.1118	-0.0340			.4495	-0.3871	0.0339		
					.4974	-0.2989	-0.0740		
					.5484	-0.3090	0.0489		
					.6007	-0.2641	0.0371		
					.6514	-0.6639	0.4378		
					.7000	-1.3615	0.2523		
					.7795	-0.2242	-0.2653		
					.8547	-0.0039	-0.2272		
					.9033	0.0811	-0.1927		
					.9522	0.0490	-0.0415		

The heading for the right table: y/s = 0.698

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-0.2734	0.0857		
.2458	-0.4501	0.1737		
.2915	-0.3477	0.0822		
.3454	-0.4809	0.1760		
.4519	-0.3485	0.1255		
.5497	-0.8208	0.4550		
.6025	-1.6954	0.3295		
.6545	-0.3330	-0.9510		
.7049	0.2490	-0.7048		
.7808	0.0270	-0.2107		

(t-1) Tabulated data for test case 9E42 (point.90-D-32)
Figure 6. Continued.
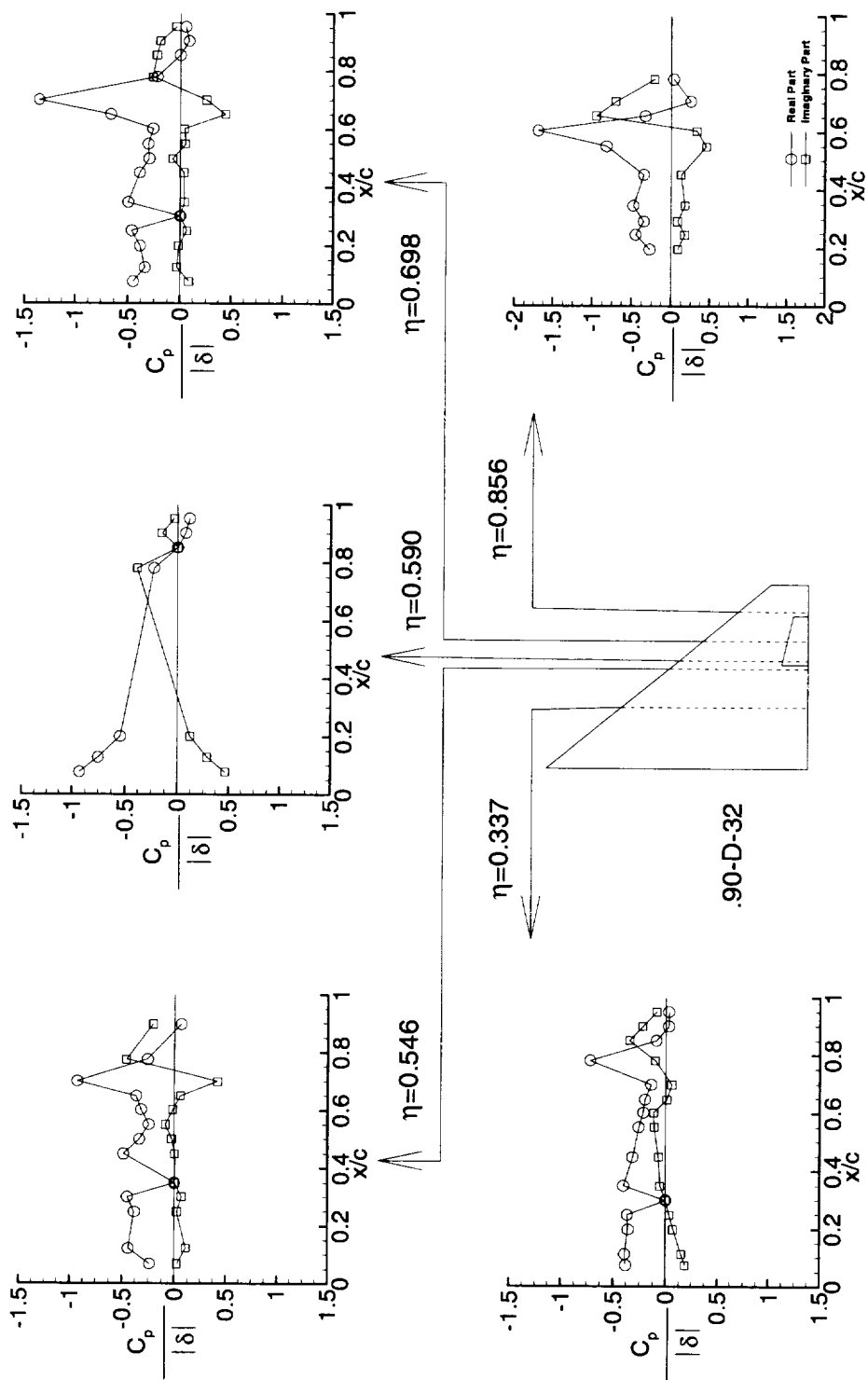
(t-2) Plot of data for test case 9E42 (point.90-D-32)
Figure 6. Continued.

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MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.924	197.6	551.8	653.9	0.05	0.00	3.89	10.25*10**6

$$f = 22.00 \text{ Hz} \qquad k = 0.459$$

y/s = 0.337

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.0731	0.0150	-0.0236		
.1120	0.0002	0.0015		
.1974	0.0462	0.0091		
.2478	0.0415	0.0306		
.2987	0.0326	0.0509		
.3486	0.0275	0.0587		
.4477	-0.0133	0.0559		
.5506	-0.0631	0.0148		
.6009	-0.0912	-0.0053		
.6459	-0.0681	-0.0382		
.6979	-0.0164	-0.0793		
.7805	0.1556	-0.0333		
.8500	-0.1618	0.3584		
.8996	-0.2386	0.1123		
.9495	-0.1014	0.0074		

y/s = 0.546

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.0681	0.0222	0.0465		
.1217	0.0017	0.0024		
.2485	-0.0305	0.0207		
.3004	-0.0050	-0.0090		
.3481	-0.0474	-0.0163		
.4487	-0.0320	-0.0563		
.4997	0.0003	-0.0574		
.5500	0.0213	-0.0612		
.6014	0.0599	-0.0477		
.6494	0.0662	-0.0203		
.6995	0.0810	-0.0017		
.7747	-0.3071	0.9177		
.8964	-0.3891	-0.0306		

y/s = 0.590

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.0767	0.0718	0.0699		
.1271	-0.0011	0.0010		
.1993	-0.0171	0.0275		
.7802	-1.4898	1.3892		
.8514	-1.0898	-0.0190		
.9016	-0.4394	-0.2942		
.9511	0.1341	-0.2639		

y/s = 0.698

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.0754	0.0000	0.0000		
.1237	0.0142	0.0038		
.1980	-0.0197	0.0101		
.2502	-0.0161	-0.0019		
.3001	-0.0185	-0.0050		
.3476	-0.0142	-0.0241		
.4495	0.0135	-0.0358		
.4974	0.0141	-0.0292		
.5484	0.0452	-0.0247		
.6007	0.0289	-0.0056		
.6514	0.0251	0.0086		
.7000	0.0074	0.0346		
.7795	-2.7512	1.5502		
.8547	-1.3259	-0.2649		
.9033	-0.4606	-0.3906		
.9522	0.1102	-0.3467		

y/s = 0.856

x/c	Upper Real	Upper Imag	Lower Real	Lower Imag
.1955	0.0195	-0.0067		
.2458	0.0378	-0.0124		
.2915	0.0583	-0.0284		
.3454	0.0631	0.0057		
.4519	0.0383	0.0008		
.5497	0.0233	0.0126		
.6025	0.0014	0.0147		
.6545	-0.0150	0.0916		
.7049	-0.9545	1.6870		
.7808	0.0000	0.0000		

(u-1) Tabulated data for test case 9E43 (point .92-D-36)
Figure 6. Continued.
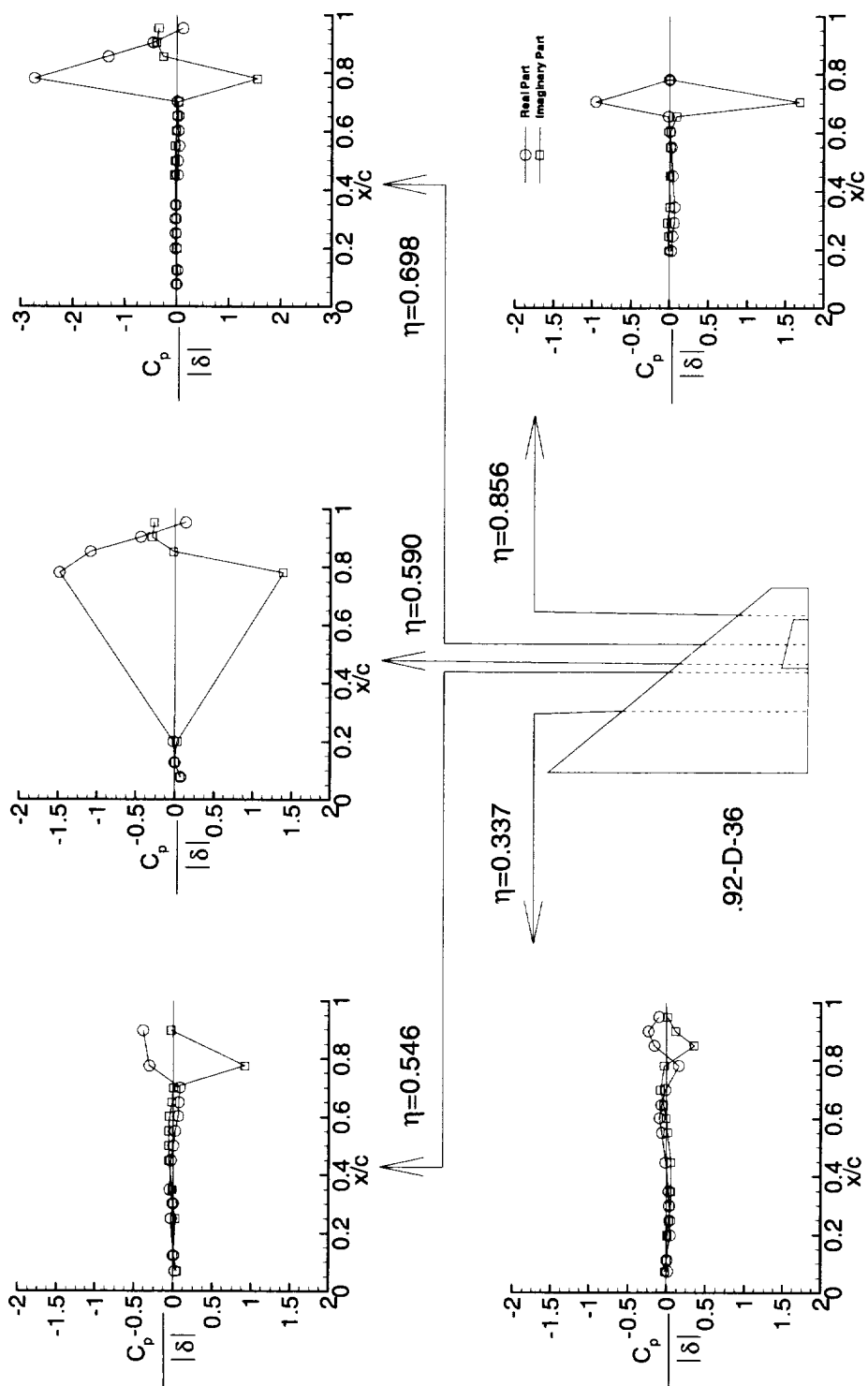
(u-2) Plot of data for test case 9E43 (point.92-D-36)
Figure 6. Continued.

.90-D-34

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.898	191.0	564.2	652.9	0.05	0.00	1.97	9.81*10**6

f = 16.00 Hz   k = 0.339

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-0.3013	0.0499		
.1120	-0.2913	0.0378		
.1974	-0.2685	0.0330		
.2478	-0.2741	0.0346		
.2987	0.0000	0.0000		
.3486	-0.2817	0.0153		
.4477	-0.1886	0.0135		
.5506	-0.1547	-0.0273		
.6009	-0.2113	0.0203		
.6459	-0.3618	0.0743		
.6979	-0.2843	-0.0199		
.7805	0.0269	-0.1191		
.8500	0.0034	-0.0435		
.8996	0.0000	0.0000		
.9495	0.0144	0.0022		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-0.1794	0.0182		
.1217	-0.3432	0.0446		
.2485	-0.2959	0.0212		
.3004	-0.2755	0.0207		
.3481	-0.0012	0.0026		
.4487	-0.2966	-0.0052		
.4997	-0.2409	0.0156		
.5500	-0.2472	0.0378		
.6014	-0.2591	0.0373		
.6494	-0.3418	0.0708		
.6995	-0.7041	0.0616		
.7747	0.0795	-0.1321		
.8964	-0.0226	0.0131		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-0.8285	0.1580		
.1271	-0.6188	0.0903		
.1993	-0.4433	0.0388		
.7802	0.0306	-0.0562		
.8514	-0.0005	-0.0029		
.9016	0.0074	0.0047		
.9511	-0.0326	0.0243		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-0.3791	0.0378		
.1237	-0.2641	0.0175		
.1980	-0.3079	0.0151		
.2502	-0.4083	0.0379		
.3001	-0.0025	0.0016		
.3476	-0.4359	0.0175		
.4495	-0.4185	0.0521		
.4974	-0.2814	0.0202		
.5484	-0.3744	0.0236		
.6007	-0.3606	-0.0006		
.6514	-0.5240	-0.1345		
.7000	-0.1937	-0.2435		
.7795	0.1085	-0.0208		
.8547	0.1410	-0.0208		
.9033	0.1367	-0.0281		
.9522	-0.0165	0.0164		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-0.3051	0.0445		
.2458	-0.4523	0.0628		
.2915	-0.4239	0.0558		
.3454	-0.3990	0.0433		
.4519	-0.3243	0.0307		
.5497	-0.5828	0.0459		
.6025	-0.4770	-0.3278		
.6545	0.3344	-0.2980		
.7049	0.2804	-0.0309		
.7808	0.0718	0.0442		

(v-1) Tabulated data for test case 9E44 (point.90-D-34)
Figure 6. Continued.
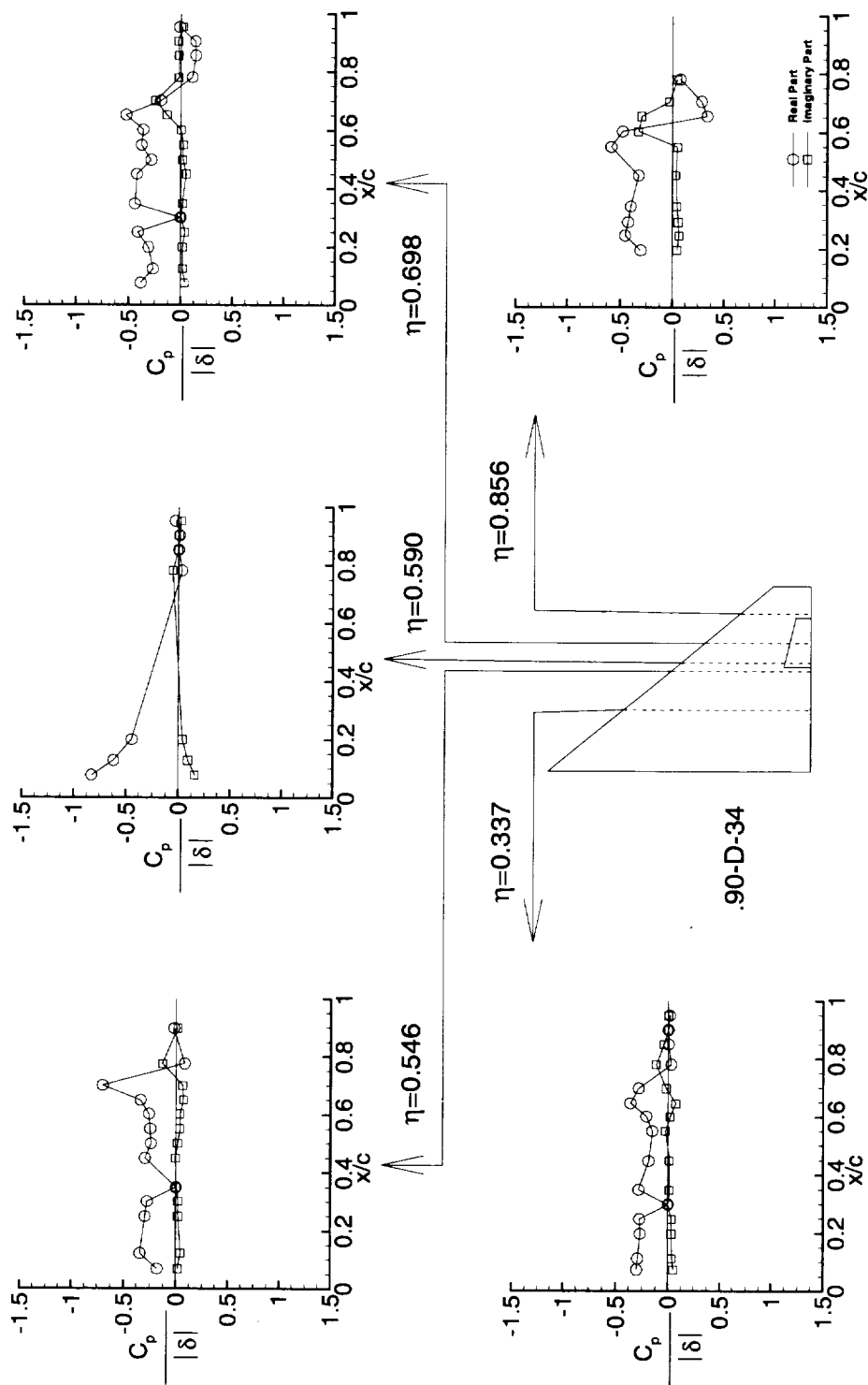
(v-2) Plot of data for test case 9E44 (point.90-D-34)
Figure 6. Continued.

.90-D-36

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.899	191.3	564.4	652.8	0.04	0.00	5.82	9.81*10**6

f = 16.01 Hz   k = 0.340

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	-0.0064	0.0020		
.1120	-0.0057	0.0008		
.1974	-0.0108	0.0037		
.2478	-0.0198	0.0034		
.2987	-0.0248	0.0018		
.3486	-0.0326	-0.0076		
.4477	-0.0533	-0.0419		
.5506	-0.0383	-0.1311		
.6009	-0.0021	-0.2273		
.6459	0.2323	-0.3257		
.6979	0.5865	-0.0810		
.7805	0.0531	0.8903		
.8500	-0.4548	0.2063		
.8996	-0.2845	0.0070		
.9495	-0.1065	-0.0269		

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-0.0062	0.0181		
.1217	-0.0135	0.0174		
.2485	-0.0294	0.0083		
.3004	-0.0209	0.0025		
.3481	-0.0647	-0.0127		
.4487	-0.0384	-0.0854		
.4997	-0.0458	-0.1266		
.5500	0.0094	-0.1726		
.6014	0.1847	-0.2446		
.6494	0.5069	-0.0893		
.6995	0.5067	0.6144		
.7747	-0.8897	0.8712		
.8964	-0.3981	-0.1187		

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-0.0186	0.0218		
.1271	-0.0183	0.0138		
.1993	-0.0317	0.0070		
.7802	-1.5484	0.7286		
.8514	-1.2725	-0.1743		
.9016	-0.4227	-0.3117		
.9511	0.1215	-0.2143		

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	0.0000	0.0000		
.1237	-0.0527	-0.0169		
.1980	-0.0547	-0.0599		
.2502	-0.0416	-0.0891		
.3001	-0.0246	-0.1119		
.3476	0.0070	-0.1622		
.4495	0.1728	-0.2345		
.4974	0.2554	-0.1233		
.5484	0.4075	-0.0142		
.6007	0.4828	0.3344		
.6514	0.1288	0.9096		
.7000	-0.9172	1.2764		
.7795	-2.1792	0.5152		
.8547	-1.5018	-0.4165		
.9033	-0.3844	-0.3437		
.9522	0.1408	-0.2733		

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	-0.0121	-0.0976		
.2458	0.0222	-0.1666		
.2915	0.0538	-0.1501		
.3454	0.1378	-0.1059		
.4519	0.2510	0.0235		
.5497	0.1170	0.5472		
.6025	0.0000	0.0000		
.6545	-1.1441	0.9331		
.7049	-1.6311	0.6957		
.7808	0.0000	0.0000		

(w-1) Tabulated data for test case 9E45 (point .90-D-36)
Figure 6. Continued.

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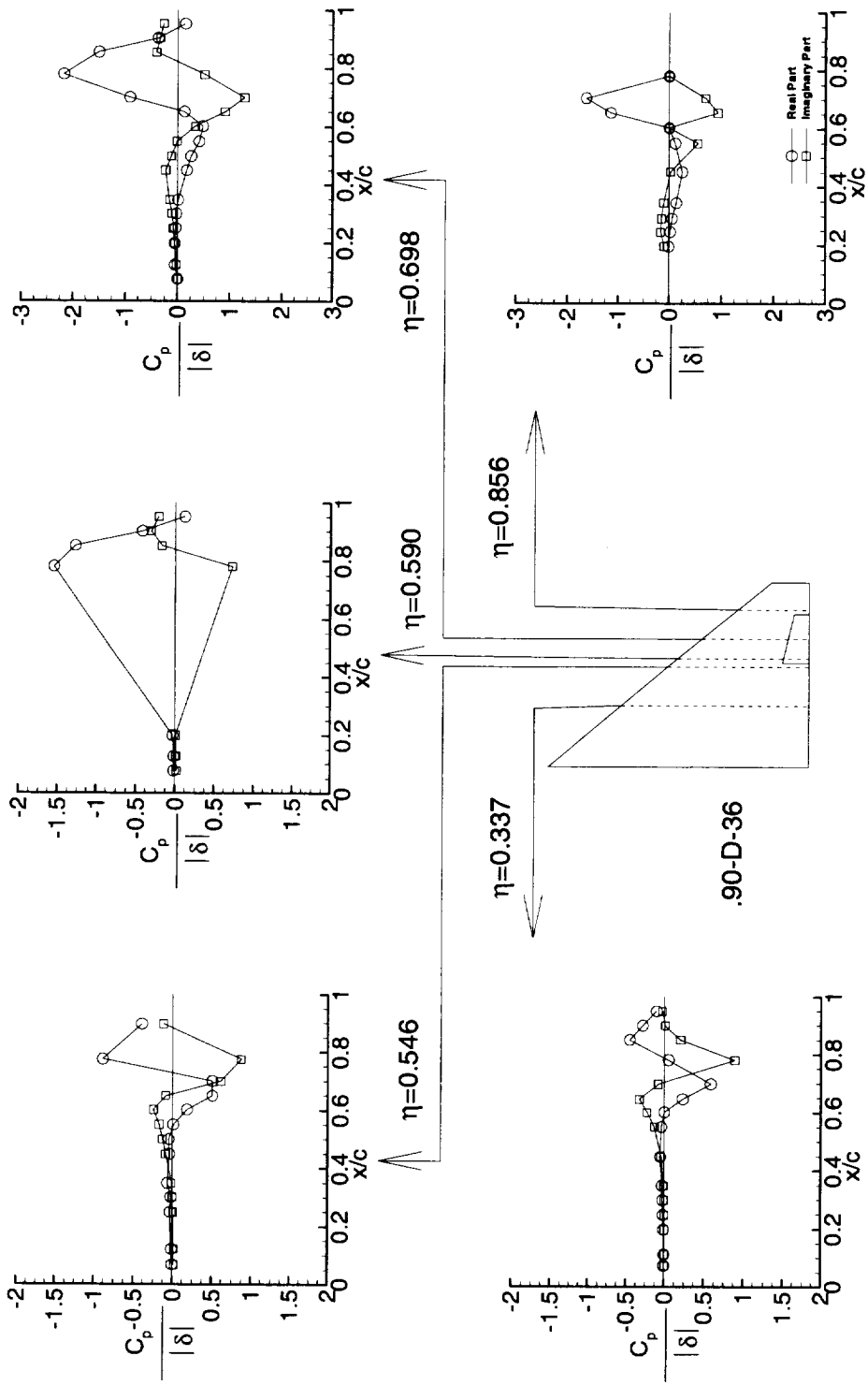
(w-2) Plot of data for test case 9E45 (point.90-D-36)
Figure 6. Continued.

.90-D-59

MACH	q psf	To deg R	H psf	ALPHAo deg	THETA deg	DELTA deg	RN
0.901	193.9	567.5	659.6	2.99	0.00	4.39	9.82*10**6

f = 16.01 Hz   k = 0.337

y/s = 0.337

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0731	0.0268	-0.0103	-0.0043	-0.0049
.1120	0.0329	-0.0084	-0.0336	0.0649
.1974	0.0297	0.0045	-0.0643	0.0573
.2478	0.0309	0.0106	-0.0908	0.0431
.2987	0.0000	0.0000	-0.0593	0.0096
.3486	0.0490	0.0215	-0.1462	-0.0198
.4477	0.0045	0.0363	-0.1342	-0.1371
.5506	-0.0242	0.0178	-0.0092	-0.2387
.6009	-0.0546	0.0357	0.1081	-0.3175
.6459	-0.0373	-0.0063	0.3995	-0.3217
.6979	-0.0049	-0.0349	0.6155	0.0474
.7805	0.0732	0.4244	0.0408	0.8304
.8500	-0.2399	0.1185	-0.4229	0.2277
.8996	-0.1595	0.0185	-0.2869	0.0408
.9495	-0.0528	-0.0086	-0.1127	-0.0136

y/s = 0.546

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0681	-0.1342	0.0077	-0.0266	0.0322
.1217	0.0116	0.0234	-0.0617	-0.0169
.2485	-0.0198	0.0243	-0.0620	-0.0774
.3004	0.0050	0.0077	-0.0204	-0.1236
.3481	0.0013	0.0001	-0.0146	-0.0783
.4487	-0.0403	-0.0241	0.1092	-0.2428
.4997	-0.0353	-0.0268	0.2006	-0.2127
.5500	-0.0444	-0.0275	0.2901	-0.1435
.6014	-0.0416	-0.0552	0.4646	0.0050
.6494	0.0051	-0.1108	0.5660	0.3769
.6995	0.4376	0.1600	0.1799	0.8184
.7747	-0.6342	0.5771	-0.9710	0.7370
.8964	-0.3976	-0.0194	-0.4507	-0.1327

y/s = 0.590

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0767	-0.0167	0.0340	0.0450	-0.0688
.1271	-0.0213	0.0281	-0.0648	-0.0242
.1993	-0.0319	0.0270	-0.0664	-0.0608
.7802	-1.0761	0.3938	-1.5173	0.4697
.8514	-0.0008	0.0011	-0.6380	-0.1171
.9016	-0.3943	-0.1633	-0.4121	-0.3373
.9511	0.0113	-0.1077	0.1769	-0.2245

y/s = 0.698

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.0754	-0.1242	-0.0746	-0.0122	0.0800
.1237	-0.1669	-0.0775	-0.0040	-0.0887
.1980	-0.0375	0.0237	0.0376	-0.1209
.2502	-0.0438	0.0130	0.0760	-0.1279
.3001	0.0000	0.0000	0.0665	-0.0664
.3476	-0.0723	-0.0109	0.2101	-0.1342
.4495	-0.0583	-0.0292	0.3650	0.0170
.4974	-0.0430	-0.0508	0.3672	0.1360
.5484	-0.0106	-0.0815	0.3440	0.3200
.6007	0.0005	-0.0914	0.1920	0.5895
.6514	0.0616	0.2362	-0.2381	0.7693
.7000	-0.8134	1.6827	-1.0390	0.9621
.7795	-1.4709	0.0874	-2.1305	0.2654
.8547	-1.1195	-0.1974	-1.3946	-0.4424
.9033	-0.4026	-0.2131	-0.3574	-0.3624
.9522	0.0155	-0.1598	0.1533	-0.2581

y/s = 0.856

	Upper		Lower	
x/c	Real	Imag	Real	Imag
.1955	0.0220	-0.0994	0.2048	0.0056
.2458	0.0010	-0.1005	0.2182	0.0526
.2915	-0.0104	-0.0895	0.2205	0.0917
.3454	-0.0018	-0.0705	0.2345	0.1789
.4519	0.0273	-0.0899	0.1206	0.3422
.5497	0.2157	0.1115	-0.1634	0.5150
.6025	0.1073	1.9064	-0.5421	0.7977
.6545	-0.8313	0.8169	-1.2556	0.8342
.7049	-1.0831	0.1696	-1.9732	0.6297
.7808	-1.1368	-0.0040		

(x-1) Tabulated data for test case 9E46 (point.90-D-59)
Figure 6. Continued.
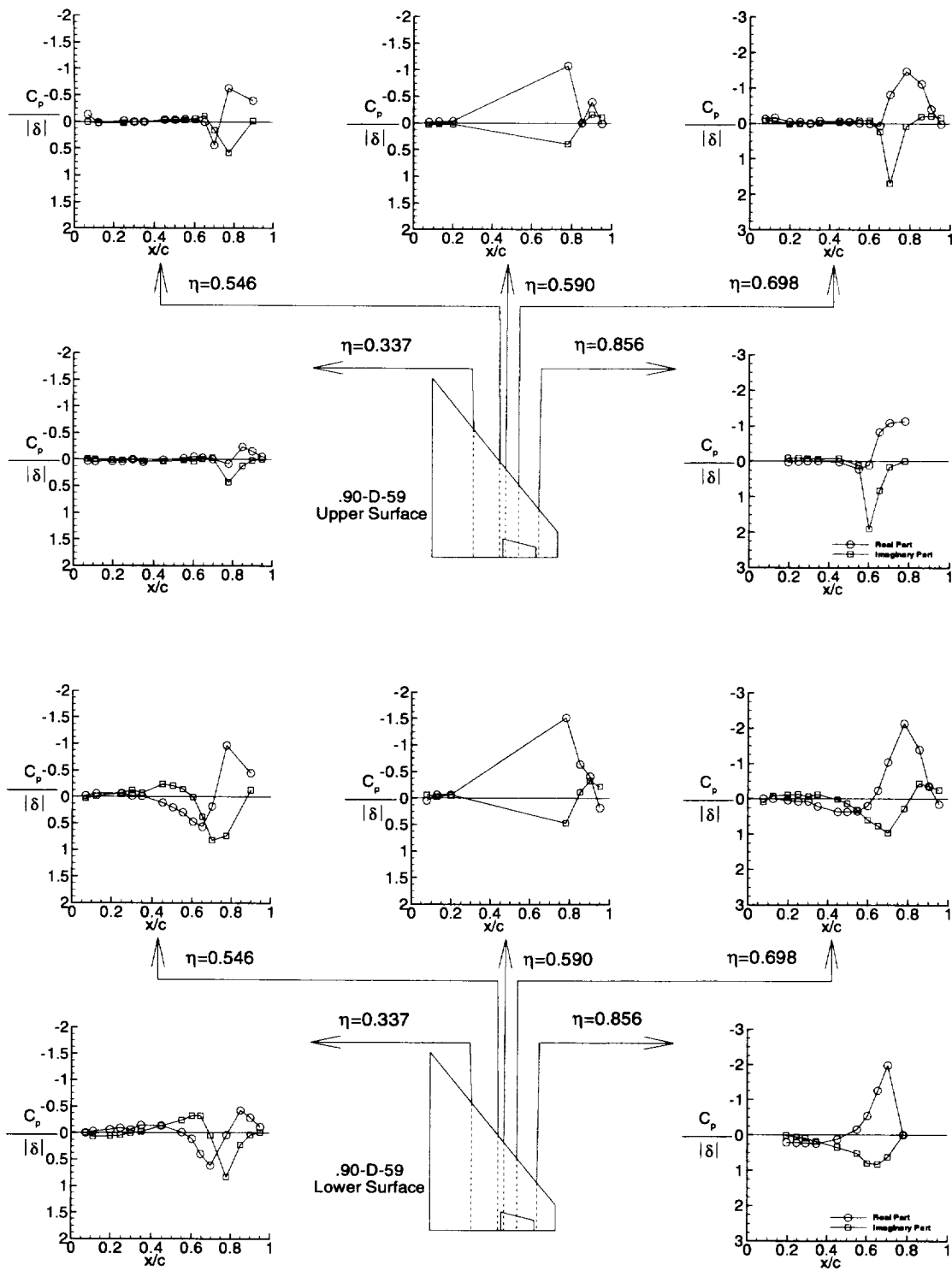
(x-2) Plot of data for test case 9E46 (point .90-D-59)
Figure 6.   Concluded.

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13. ABSTRACT (Maximum 200 words)

Computational test cases have been selected from the data set for a clipped delta wing with a six-percent-thick circular-arc airfoil section that was tested in the NASA Langley Transonic Dynamics Tunnel. The test cases include parametric variation of static angle of attack, pitching oscillation frequency, trailing-edge control surface oscillation frequency, and Mach numbers from subsonic to low supersonic values. Tables and plots of the measured pressures are presented for each case. This report provides an early release of test cases that have been proposed for a document that supplements the cases presented in AGARD Report 702.

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